ORIGINAL

21 MAY 2007

MEMORANDUM

SUBJECT: Statement of Basis for the Proposed Final Corrective Measures
Union Pacific Railroad
9th and Webster St.
Omaha, NE

FROM: Ken Herstowski
RCRA Corrective Action and Permits Branch
Air, RCRA, and Toxics Division

THRU: Lynn Slugantz, Chief
RCRA Corrective Action and Permits Branch
Air, RCRA, and Toxics Division

TO: Becky Weber, Director
Air, RCRA, and Toxics Division

Attached for your review and approval is the Statement of Basis developed for the Union Pacific Railroad facility located at 9th and Webster St., Omaha, Nebraska. The Statement of Basis proposes final corrective measures and cleanup levels for soil and groundwater which are protective of non-residential use, which consists of the following: 1) excavation and disposal of contaminated soil; 2) monitored natural attenuation; and 3) institutional controls. The Statement of Basis also includes proposed contingent corrective measures and cleanup levels which are protective of restricted residential use if future developments will include residential occupancy. The Nebraska Department of Environmental Quality declined to review the Statement of Basis before it is issued.

The public comment period will be from May 21, 2007 through July 7, 2007. A public availability session is scheduled for June 5, 2007 in Omaha.

Attachment

_____ _____
Approved Date

_____ _____
Disapproved Date

RCAP
HERSTOWSKI
5/18/07

RCAP
SLUGANTZ
5/21/07

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

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Becky Weber
Approved

5/21/07
Date

Disapproved

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ORIGINAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

STATEMENT OF BASIS

PROPOSED CORRECTIVE MEASURES FOR UNION PACIFIC RAILROAD OPERABLE UNITS NUMBER 2 AND 3

PROPOSED RESTRICTED RESIDENTIAL CORRECTIVE MEASURES FOR UPRR OU1, UPRR OU2 AND UPRR OU3

UNION PACIFIC RAILROAD
9TH AND WEBSTER STREETS
OMAHA, NEBRASKA
RCRA ID# NED000829754

This Statement of Basis proposes corrective measures and cleanup levels for non-residential use of Union Pacific Railroad Operable Units Number 2 (UPRR OU2) and Number 3 (UPRR OU3) and proposes contingent corrective measures and cleanup levels for all of the UPRR Operable Units to allow for restricted residential development. These contingent corrective measures and cleanup levels would only be necessary if either the buyer or seller of a property parcel or parcels wishes to remove the restrictions on non-residential uses. Union Pacific Railroad's (UPRR) facility is located in Omaha, Nebraska at 9th and Webster Streets. The facility originally encompassed approximately 210 acres and is just west of the Missouri River. EPA divided UPRR into three areas for cleanup called operable units. (See attached figure showing operable units.)

This Statement of Basis proposes the following remedies and contingent remedies:

1. EPA has already selected corrective measures and cleanup levels that were protective for the non-residential development of UPRR OU1 into Qwest Center. UPRR OU1 is the 100 acres transferred to the City of Omaha for redevelopment into the Qwest Center and consists of the soil above the normal high ground water level. This Statement of Basis proposes contingent corrective measures and cleanup levels to allow restricted residential uses of UPRR OU1.

2. This Statement of Basis proposes corrective measures and cleanup levels that are protective of non-residential uses at UPRR OU2. UPRR OU2 is the remaining 110 acres of the facility (the area not transferred to the City of Omaha for redevelopment into the Qwest Center) and consists of the soil above the normal high ground water table.

RCAP	CNSL	RCAP
HERSTOWSKI	STOY	SLUGANTZ
5/8/07	5/16/07	5/21/07

ORIGINAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

STATEMENT OF BASIS

PROPOSED CORRECTIVE MEASURES FOR UNION PACIFIC RAILROAD OPERABLE UNITS NUMBER 2 AND 3

PROPOSED RESTRICTED RESIDENTIAL CORRECTIVE MEASURES FOR UPRR OU1, UPRR OU2 AND UPRR OU3

UNION PACIFIC RAILROAD
9TH AND WEBSTER STREETS
OMAHA, NEBRASKA
RCRA ID# NED000829754

This Statement of Basis proposes corrective measures and cleanup levels for non-residential use of Union Pacific Railroad Operable Units Number 2 (UPRR OU2) and Number 3 (UPRR OU3) and proposes contingent corrective measures and cleanup levels for all of the UPRR Operable Units to allow for restricted residential development. These contingent corrective measures and cleanup levels would only be necessary if either the buyer or seller of a property parcel or parcels wishes to remove the restrictions on non-residential uses. Union Pacific Railroad's (UPRR) facility is located in Omaha, Nebraska at 9th and Webster Streets. The facility originally encompassed approximately 210 acres and is just west of the Missouri River. EPA divided UPRR into three areas for cleanup called operable units. (See attached figure showing operable units.)

This Statement of Basis proposes the following remedies and contingent remedies:

1. EPA has already selected corrective measures and cleanup levels that were protective for the non-residential development of UPRR OU1 into the Qwest Center. UPRR OU1 is the 100 acres transferred to the City of Omaha for redevelopment into the Qwest Center and consists of the soil above the normal high ground water level. This Statement of Basis proposes contingent corrective measures and cleanup levels to allow restricted residential uses of UPRR OU1.

2. This Statement of Basis proposes corrective measures and cleanup levels that are protective of non-residential uses at UPRR OU2. UPRR OU2 is the remaining 110 acres of the facility (the area not transferred to the City of Omaha for redevelopment into the Qwest Center) and consists of the soil above the normal high ground water table.

3. This Statement of Basis also proposes contingent corrective measures and cleanup levels for UPRR OU2 (the same contingent corrective measures and cleanup levels as those proposed for UPRR OU1) to allow restricted residential uses of UPRR OU2.

4. This Statement of Basis proposes corrective measures and cleanup levels for ground water that are protective of non-residential uses at UPRR OU3. UPRR OU3 consists of the ground water beneath both UPRR OU1 and UPRR OU2.

5. This Statement of Basis proposes contingent corrective measures and cleanup levels for ground water that are protective of restricted residential uses at UPRR OU3.

UPRR has transferred a portion of the facility consisting of the property from 12th to 14th Streets and Cuming to Izard Streets known as Union Pacific Place Lot 10. The proposed corrective measures and cleanup levels in this Statement of Basis for UPRR OU2 and UPRR OU3 will also apply to this transferred property.

For UPRR OU2, the following corrective measures are proposed to remediate soil to allow for non-residential use. EPA is also proposing that these same corrective measures would be used for remediation of contaminated soil but with cleanup levels that are protective of restricted residential use at UPRR OU1 and UPRR OU2 in addition to the corrective measures proposed for groundwater for UPRR OU3 discussed below.

- Excavation and Off-site disposal of soil above cleanup levels,
- Institutional Controls to restrict future development to non-residential, and
- Long-Term Monitoring of the effectiveness of the institutional controls.

For UPRR OU3, the following corrective measures are proposed to remediate groundwater to allow for non-residential use. EPA is also proposing that these same corrective measures would be used for remediation of contaminated groundwater but with cleanup levels that are protective of restricted residential use at UPRR OU3.

- Natural Attenuation of groundwater contamination to meet cleanup levels,
- Long-Term Monitoring of Groundwater contamination,
- Vapor Intrusion Mitigation for buildings,
- Long-Term Monitoring of Vapor Intrusion Contaminants in soil, groundwater and buildings,
- Institutional Controls to prevent unacceptable exposures from future development, and
- Long-Term Monitoring of the effectiveness of the institutional controls.

EPA's proposed corrective measures and cleanup levels for UPRR OU2 and UPRR OU3 are sufficient to protect human health and the environment for non-residential use development of the facility. EPA has already selected corrective measures and cleanup levels that were

protective for the development of UPRR OU1 into Qwest Center and other non-residential development.

The redevelopment of Omaha's riverfront area is expected to continue and has included several portions of the facility. UPRR OU1 has already been redeveloped into the Qwest Center. Saddle Creek Records located at 13th to 14th Streets from Cumming to Webster Streets is being developed with mezzanine residential occupancy. Lot 10 - Union Pacific Place located at 12th to 14th Streets and Cuming to Izard Streets is being developed into two hotels.

Discussions with the City of Omaha officials lead EPA to believe that other residential developments could be proposed. EPA notes that this would be prohibited now because of the restrictive covenants proposed in this Statement of Basis for UPRR OU2 and UPRR OU3 (and previously required for UPRR OU1) and city zoning requirements already in place. EPA believes that it is prudent to propose contingent corrective measures and cleanup levels to allow for potential restricted residential development and to provide property owners certainty in this process. Not only will this possibly encourage further redevelopment of the facility but it would eliminate possible delays to land transfers because of EPA's administrative processes for modifying approved corrective action measures.

In this Statement of Basis, EPA is proposing contingent corrective measures and cleanup levels for restricted residential use for UPRR. The cleanup levels for both soil and groundwater must both be met in order for restricted residential developments to proceed. For example, for restricted residential use development of UPRR OU2 property, cleanup levels established for both UPRR OU2 and UPRR OU3 would both have to be met for construction to begin. Note however that vapor intrusion mitigation measures can be used for development to begin before UPRR OU3 groundwater cleanup levels have been achieved.

COMMUNITY ROLE IN SELECTION PROCESS

The U.S. Environmental Protection Agency (EPA) Region 7 is issuing this Statement of Basis as part of the public participation responsibilities under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Sections 6901 to 6992k, selecting corrective measures for UPRR. It identifies EPA's proposed corrective measures with the rationale for this preference.

Public involvement is important in the development and selection of corrective measures. The EPA encourages public participation and relies on public input to consider community concerns in the selection of effective corrective measures. EPA seeks public comment on all the corrective measures described in this document. The public is also invited to provide comments on any corrective measures not included in the corrective measures study.

An administrative record has been prepared that includes the information EPA used to prepare this Statement of Basis. The administrative record is available for review during the public comment period from May 21, 2007, through July 7, 2007.

All written comments should be addressed to:

U.S. Environmental Protection Agency Region 7
Attn: Ken Herstowski, ARTD/RCAP
901 N. 5th St.
Kansas City, KS 66101

For more information, please contact Mr. Herstowski by phone at (913) 551-7631, by facsimile at (913) 551-7947 or by email at herstowski.ken@epa.gov.

Written comments received by EPA and comments received during the hearing will be documented in a Response to Comments. EPA will make a Final Corrective Measures Decision after reviewing all comments.

An information repository has been established at the W. Dale Clarke Branch of the Omaha Public Library at 215 S. 15th St., and is available during normal library hours. The administrative record titled "Administrative Record for Corrective Measures at UPRR OU2 and UPRR OU3" (hereafter the Administrative Record) is at the library and at the EPA Region 7 Records Center, 901 N. 5th St., Kansas City, Kansas, from 7 a.m. to 5 p.m. weekdays (excluding Federal holidays).

The information summarized in this Statement of Basis is described in greater detail in the documents and reports contained in the Administrative Record. EPA encourages you to review the Administrative Record for a more complete understanding of the proposed corrective measures and the RCRA corrective action activities that have been conducted at UPRR.

This Statement of Basis explains EPA's proposed corrective measures for UPRR OU2 and UPRR OU3 and solicits public comments on all the corrective measures evaluated. The corrective measures described in this Statement of Basis will ensure that contaminants which have been released at UPRR will be controlled or cleaned up. Changes to the proposed corrective measures may be made if public comments or additional data indicate such a change will result in a more appropriate action. The EPA will make a final decision to select the corrective measures only after the public comment period ends and EPA has reviewed the comments received. EPA may modify the corrective measures proposed in this Statement of Basis or select other corrective measures based upon new information or the comments received.

FACILITY BACKGROUND

Union Pacific Railroad (UPRR) is located at 9th and Webster Streets in Omaha, Nebraska. The facility encompasses approximately 210 acres and is just west of the Missouri River.

UPRR used the facility for approximately 100 years with its principal functions as a railroad fueling facility, repair shop, paint shop and car body repair shop for the locomotive and car fleet. UPRR used steam engines from the 1860s until the mid-1950s. Steam engines were fueled by burning wood, coal, fuel oil, and petroleum based fuels. The engines required little lubrication and had no electrical components. In the mid-1950s, diesel powered locomotives began to predominate. During that time, the entire facility was converted from the maintenance of steam engines to diesel engines. From the 1950s to 1988 the facility was a major overhaul and maintenance facility. In 1988, most of the operations, except the Print Shop and the Car Shop, moved to Little Rock, Arkansas. After the operations were moved, demolition of the facility began.

Maintenance and repair activities involved various hazardous substances, principally paints, paint solvents, caustic cleaning chemicals and degreasing solvents. Wastes generated from maintenance and repair included paint wastes, spent solvents and asbestos containing materials. Some of those wastes have been disposed of on-site and have resulted in contamination of soil and ground water. For a more detailed discussion of the historical operation of the facility and of solid waste management, please review the RCRA Facility Investigation reports in the Administrative Record. (Readers note: whenever a document or report is referred to in this Statement of Basis, that document or report may be found in the Administrative Record.)

In August 1980, UPRR submitted notification of hazardous waste activity to obtain interim status under the Resource Conservation and Recovery Act (RCRA) for the storage of hazardous wastes in containers. UPRR has ceased storing hazardous wastes at the facility and has closed the container storage area in accordance with hazardous waste regulations. EPA conducted a study of the UPRR facility to identify Solid Waste Management Units (SWMUs) and areas of Concern (AOCs) which may have released hazardous wastes or hazardous constituents to the environment. This study, called a RCRA Facility Assessment (RFA), identified a total of 31 SWMUs and 18 AOCs. EPA subsequently identified another SWMU for a total of 32 SWMUs. For more details on SWMUs and AOCs see the RFA Report dated June 16, 1998. EPA also conducted sampling and analysis to determine the presence of hazardous constituents. The results of EPA's sampling are in the "Final Sampling Strategy Report" dated September 25, 1998.

EPA has authority to issue administrative orders pursuant to Section 3008(h) of the Resource Conservation and Recovery Act (RCRA) to owners or operators of a hazardous waste management facility. Based upon the information in the RFA, EPA issued such an order to UPRR. See the Administrative Order on Consent (hereafter the "Order") dated February 29, 2000, in the Adminstrative Record. The Order divided the work at the site into three operable units.

About 100 acres of the site (UPRR OU1) has been transferred to the City of Omaha for the development of the Qwest Center. Twenty SWMUs and fourteen AOCs are within or partially within UPRR OU1. UPRR OU1 is limited to both surface and subsurface soil above the normal

high water table. EPA issued a final corrective measures decision for UPRR OU1 on June 12, 2000. See attached figure "OU1 Site Location Plan" and figure "Operable Units" for the division of the facility into UPRR OU1 and UPRR OU2 (both of which comprise UPRR OU3 for groundwater).

The City of Omaha has subsequently transferred a portion of UPRR OU1 located at 13th to 14th Streets from Cuming to Webster Streets. That area is now known as Saddle Creek Records. EPA modified the corrective measures decision for UPRR OU1 which is part of the Saddle Creek Records development project on March 31, 2006. The corrective measures proposed in this Statement of Basis for UPRR OU3 will also apply to the groundwater beneath the Qwest Center and Saddle Creek Records.

The remaining acreage of the site, which is about 110 acres, comprises UPRR OU2 and is limited to both surface and subsurface soil above the normal high water table. Seven SWMUs and six AOCs are within or partially within UPRR OU2. See the attached figure titled "OU SWMU and AOC Location Map" for the locations of these SWMUs and AOCs.

- SWMU 14 – Paint Barrel Pits
- SWMU 15 – Old Transformer Storage Area
- SWMU 16 – Steel Car Shop
- SWMU 17 – Tin and Plating Shop
- SWMU 18 – North and South Open Drum Storage
- SWMU 20 – North and South Acetylene Sludge Pits
- SWMU 21 – Chemical Spill Area
- AOC 10 – Eight Street Yard
- AOC 11 – Car Holding Area
- AOC 12 – Car Demolishing Area
- AOC 13 – Grace Street Tank and Pumphouse
- AOC 14 – Grace Street Yard
- AOC 16 – Oil Pipeline

UPRR has sold a portion of OU2 located between 12th to 14th Streets and Cuming to Izard Streets which is now know as "Lot 10 - Union Pacific Place." The corrective measures proposed in this Statement of Basis for UPRR OU2 will also apply to Lot 10 - Union Pacific Place.

All groundwater beneath the site (both UPRR OU1 and UPRR OU2) comprises UPRR OU3. The corrective measures proposed in this Statement of Basis for UPRR OU3 will apply to the groundwater beneath the Qwest Center, the portion of UPRR OU1 within Saddle Creek Records, the rest of UPRR OU1, Union Pacific Place, and UPRR OU2.

SUMMARY OF UPRR OU2 RISKS

A baseline risk assessment was conducted as part of the RCRA Facility Investigation (RFI) for UPRR OU2 to address the potential for adverse human health effects from exposure to chemicals, lead and asbestos in soil. The RFI did not include evaluation of future residential exposures based upon the assumption that no residential occupancy would occur. The following exposure scenarios were evaluated in the baseline risk assessment:

- Construction workers exposed to chemicals in the surface and subsurface soil from incidental ingestion of soil, dermal contact with soil, and inhalation exposure.

- On-site workers exposed to chemicals in the surface soil from incidental ingestion of soil, dermal contact with soil, and inhalation exposure.

- Recreational users exposed to chemicals in the surface and subsurface soil from incidental ingestion of soil, dermal contact with soil, and inhalation exposure.

Although many contaminants have been detected at UPRR OU2, only certain contaminants were evaluated in the risk assessment. These contaminants are called "Contaminants of Potential Concern" (COPCs). An organic chemical contaminant was included in the risk assessment as a COPC if it was detected in more than five percent of samples collected in the RFI. An inorganic chemical contaminant (arsenic for example), was evaluated in the risk assessment only if present above naturally occurring levels. Naturally occurring levels are also called "background" levels and are the levels found in areas that have not been contaminated by activities of the facility.

Health risks from long-term exposure (also referred to as chronic exposure) to the COPCs are evaluated on either the potential to cause cancer or the toxicity. Estimates are made of potential increases in carcinogenic and noncarcinogenic risks. This cancer risk is the probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogenic contaminant. In accordance with EPA's National Contingency Plan, acceptable cleanup levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 1 in 10,000 (referred to as $1x10^{-4}$ risk) and 1 in 1,000,000 (referred to as $1x10^{-6}$ risk) using information on the relationship between dose and response. A carcinogenic risk of $1x10^{-6}$ equates to one cancer diagnosis beyond what is expected in a population of 1,000,000 people exposed to a certain chemical under certain exposure scenarios. Likewise, a carcinogenic risk of $1x10^{-4}$ equates to one cancer diagnosis beyond what is expected in a population of 10,000 people exposed to a certain chemical under certain exposure scenarios.

For non-carcinogenic (toxic) contaminants, acceptable exposure levels represent concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety. Estimates of health risks from non- carcinogenic contaminants are developed based upon their toxicity. Non- carcinogenic contaminants are those contaminants that are in Groups D and E.

This estimate is called a "hazard quotient" or "HQ" and is the ratio of estimated daily intake of a contaminant to a reference dose which has no observed health effects.

The risks from exposure to lead are evaluated separately as a special non-cancer contaminant. Exposure to lead may cause adverse systemic (non-cancer) effects when blood lead levels exceed 10 micrograms per deciliter. EPA has developed models to predict when soil concentrations of lead will cause blood lead levels to exceed that level. EPA's "Technical Review Workgroup for Lead" has developed interim guidance for assessing lead risks and establishing corrective action objectives so that blood lead levels in at risk (pregnant) workers will not exceed 10 micrograms per deciliter. Lead risks at UPRR were evaluated with EPA's "Adult Lead Model." (see OSWER Directive# 9285.7-46, August 2001)

The risk assessment did not evaluate the SWMUs and AOCs in UPRR OU2 on an individual basis with the exception of the North and South Acetylene Sludge Pits (SWMU 20). Instead, each contaminant of concern was evaluated throughout UPRR OU2. The Acetylene Sludge Pits were specifically evaluated by the risk assessment. The risk assessment shows that only certain contaminants at UPRR are a potential health risk. The following provides information on current or potential health risks to human health from contaminants in soil at UPRR OU2 and separate summary of current or potential health risks to human health from contaminants in soil at the North and South Acetylene Sludge Pits (SWMU 20).

Construction Workers: This scenario predicts the risk to persons involved in subsurface construction activities for a maximum exposure of 12 hours per day for 120 days during one year. The COPCs evaluated for soil have a combined estimated excess cancer risk of $4x10^{-7}$. The potential exposure to subsurface soil has a hazard quotient or HQ of 0.14. The risks to construction workers in this scenario are below EPA's target levels of $1x10^{-4}$ to $1x10^{-6}$ for cancer risks and below the target HQ of 1 for chemical toxicity.

At the North and South Acetylene Sludge Pits (SWMU 20), on-site worker exposure from contaminants was evaluated separately but utilized the same exposure factors of 12 hours per day for 120 days during one year. The COPCs evaluated for soil have a combined estimated excess cancer risk of $5x10^{-6}$. The potential exposure to subsurface soil has a HQ of 1.64. The risks to construction workers in this scenario are within EPA's target levels of $1x10^{-4}$ to $1x10^{-6}$ for cancer risks. However, the HQ of 1.64 for the COPCs at SWMU 20 is above the EPA's target level HQ of 1 or less.

On-site Workers: This scenario predicts the long-term risks to persons involved in the day to day outdoor activities at the facility. Workers are assumed to be exposed to COPCs for 8 hours per day for 250 days a year over 25 years while working outdoors. These workers would only be exposed to contaminants in surface soil, soil from the ground surface to one foot in depth, and would not be exposed to subsurface soil, soil below one foot in depth. The risk assessment estimates that the excess cancer risk from exposure to the COPCs is $2x10^{-5}$. The hazard quotient is estimated to be 0.15. The risks to occupational workers in this scenario fall within EPA's

target range for cancer risks (which is between $1x10^{-4}$ and $1x10^{-6}$) and below the target HQ of 1 for chemical toxicity.

At the North and South Acetylene Sludge Pits (SWMU 20), on-site worker exposure from contaminants was evaluated separately but utilized the same exposure factors of 8 hours per day for 250 days a year over 25 years while working outdoors. These workers would only be exposed to contaminants in surface soil, soil from the ground surface to one foot in depth, and would not be exposed to subsurface soil, soil below one foot in depth. The risk assessment estimates that the excess cancer risk from exposure to the COPCs is $1x10^{-6}$. The hazard quotient is estimated to be 1. The risks to occupational workers in this scenario fall within EPA's target range for cancer risks (which is between $1x10^{-4}$ and $1x10^{-6}$) and is at the target HQ of 1 for chemical toxicity.

Recreational Users: This scenario, titled "Trespasser Exposure" in the RFI, predicts the long-term risks to persons who visit the facility for 4 hours per day for 32 days a year over 8 years. Recreational users would not be exposed to subsurface soil. The risk assessment estimates that the excess cancer risk from exposure to the COPCs is $2x10^{-6}$. The HQ is estimated to be 0.05. The risks to recreational users in this scenario fall within EPA's target range for cancer risks (which is between $1x10^{-4}$ and $1x10^{-6}$) and below the target HQ of 1 for chemical toxicity.

At the North and South Acetylene Sludge Pits (SWMU 20), recreational user, titled "Trespasser Exposure in the RFI, exposure from contaminants was evaluated separately but utilized the same exposure factors of 4 hours per day for 32 days a year over 8 years. Recreational users would not be exposed to subsurface soil. The risk assessment estimates that the excess cancer risk from exposure to the COPCs is $9x10^{-6}$. The HQ is estimated to be 0.14. The risks to recreational users in this scenario fall within EPA's target range for cancer risks (which is between $1x10^{-4}$ and $1x10^{-6}$) and below the target HQ of 1 for chemical toxicity.

Lead Risks: EPA has developed interim guidance for assessing lead risks and establishing corrective action objectives so that blood lead levels in adult workers will not exceed 10 micrograms per deciliter. To ensure the protection of on-site and construction workers, a corrective action objective of 1,218 milligrams per kilogram in soil is proposed using EPA's adult lead model. This corrective action objective is for all surface soil (soil down to two feet deep) and for subsurface soil where workers could be exposed to contaminated soil during construction.

Ecological Risks: An ecological risk assessment was not conducted for UPRR OU2. The facility is located in an urban area and the proposed redevelopment of the facility for either non-residential use or restricted residential use would not be expected to provide significant habitat for wildlife. The facility is not likely to affect wildlife habitat which may be nearby. Long term monitoring is proposed as one of the corrective measures to determine if contaminants are being released to nearby wildlife habitat. If ongoing releases are found after implementation of the

corrective measures, an ecological risk assessment will be required to determine what additional corrective measures and/or changes to corrective action objectives may be necessary.

The following table summarizes the soil contamination at UPRR OU2. For more detailed information please see the UPRR OU2 RFI Report in the Administrative Record.

Contaminant	UPRR OU2 RFI Soil Results excluding Acetylene Sludge Pits (mg/kg)	UPRR OU2 RFI Soil Results at Acetylene Sludge Pits (mg/kg)
Acetone	0.0297-0.0371	Not Detected
Benzene	0.006	0.0097
cis-1,2-Dichloroethene	0.0012-0.891	0.0891-10.9
trans-1,2-Dichloroethene	0.0188-0.0256	0.0333-0.227
Ethyl Benzene	Not Detected	0.0057-119
Methylene Chloride	0.0016-0.015	Not Detected
Toluene	0.0016-0.132	Not Detected
Tetrachloroethene	0.0022-115	1.840-5550
1,1,1-Trichloroethane	Not Detected	26.6
Trichloroethene	0.0013-3.05	0.0127-1.350
1,2,4-Trimethylbenzene	0.0038-0.018	0.0053-0.396
Vinyl Chloride	0.145	0.0167-0.819
Xylenes	0.0031-0.0279	0.0184-634
Anthracene	1	0.66-2.9
Benzo(a)anthracene	1.6-5.2	1.7-14.2
Benzo(a)pyrene	1.3-5.3	1.5-15.9
Benzo(b)flouranthene	5.7	1.5-13.8
Chrysene	1-5.3	1.7-14.4
Dibenzo(a,h)anthracene	Not Detected	3.3
Fluoranthene	1.2-8.5	1.2-5.4
Indeno(1,2,3-cd)pyrene	4	8.3
Pyrene	2.1-9.9	0.97-17.3
Naphthalene	2.2	0.154
Chlordane	0.00277-0.022	Not Detected
4,4-DDE	0.00744-0.0255	Not Detected
4,4-DDT	0.00904-0.144	Not Detected
Dieldrin	0.0127-0.0388	Not Detected
Endosulfan II	0.00748-0.0291	Not Detected
Endrin aldehyde	0.00918-0.0116	Not Detected
PCBs (total all PCBs)	0.032-2.4	0.062-1
Antimony	11-1230	Not Detected
Arsenic	2.5-300	1.5-26

Contaminant	UPRR OU2 RFI Soil Results excluding Acetylene Sludge Pits (mg/kg)	UPRR OU2 RFI Soil Results at Acetylene Sludge Pits (mg/kg)
Cadmium	1.2-13	1.1-36
Chromium	2.7-41.6	5.5-190
Copper	3.3-2080	Not Detected
Lead	3.3-4220	5.9-3400
Mercury	0.1-2.2	0.021-0.603
Selenium	0.6-6.9	1.1
Silver	1.1-13.4	4.9
Zinc	16.5-2140	Not Detected

PROPOSED UPRR OU2 SOIL CLEANUP LEVELS

Using the information in the human health risk assessment, EPA is proposing soil cleanup levels that will be protective of non-residential uses of UPRR OU2 including construction workers, on-site workers and recreational users. Using the information in the human health risk assessment, soil cleanup levels, also called corrective action objectives, are proposed for the COPCs. These soil cleanup levels are concentrations of contaminants in soil that are calculated to prevent potential health risks during construction and redevelopment of the facility and later occupancy by workers.

In accordance with EPA's National Contingency Plan, for known or suspected carcinogens, acceptable cleanup levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 1 in 10,000 (referred to as $1x10^{-4}$ risk) and 1 in 1,000,000 (referred to as $1x10^{-6}$ risk) using information on the relationship between dose and response. The $1x10^{-6}$ risk level shall be used as the point of departure for determining remediation goals for alternatives when applicable or relevant and appropriate requirements are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure. (40 CFR 300.430(e)(2)(i)(A)(2)) EPA is proposing soil cleanup levels based upon $1x10^{-5}$ target risk. A target risk of $1x10^{-5}$ is the mid-point of EPA's range of $1x10^{-4}$ to $1x10^{-6}$ for cancer risks. EPA believes that this provides an adequate level of protection for occupational workers since the risk assessment was based upon exposure factors for outdoor workers and not indoor workers. The risk to indoor workers would be significantly below EPA's lowest target cancer risk of $1x10^{-6}$.

In accordance with EPA's National Contingency Plan for chemicals which are not known or suspected carcinogens (non- carcinogenic contaminants), a HQ of 1 (or less) is considered to be safe for human health. EPA is proposing soil cleanup levels where the total HQ is 1 or above. The cleanup levels calculated will also meet the requirements of EPA's National Contingency Plan. (40 CFR 300.430(e)(2)(i)(A)(1))

EPA's "Technical Review Workgroup for Lead" has developed interim guidance for assessing lead risks and establishing corrective action objectives so that blood lead levels in at risk (pregnant) workers will not exceed 10 micrograms per deciliter. For lead, the non-residential cleanup level was developed using EPA's Adult Lead Model.

PROPOSED SOIL CLEANUP LEVELS

Contaminant	Health Effect	Non-Residential Cleanup Level (mg/kg)
Acetone	Toxicity	54000
Benzene	Cancer	24
cis-1,2-Dichloroethene	Toxicity	150
trans-1,2-Dichloroethene	Toxicity	230
Ethyl Benzene	Toxicity	6000
Methylene Chloride	Cancer	21
Toluene	Toxicity	2000
Tetrachloroethene	Cancer	13
1,1,1-Trichloroethane	Toxicity	1200
Trichloroethene	Cancer	0.11
1,2,4-Trimethylbenzene	Toxicity	170
Vinyl Chloride	Cancer	0.75
Xylenes	Toxicity	4500
Anthracene	Toxicity	100000
Benzo(a)anthracene	Cancer	2
Benzo(a)pyrene	Cancer	0.21
Benzo(b)flouranthene	Cancer	2
Chrysene	Cancer	210
Dibenzo(a,h)anthracene	Cancer	0.21
Fluoranthene	Toxicity	22000
Indeno(1,2,3-cd)pyrene	Cancer	2
Pyrene	Toxicity	29000
Naphthalene	Toxicity	190
Bis(2-ethylhexyl)phthalate	Cancer	120
Chlordane	Cancer	6.5
4,4-DDE	Cancer	7
4,4-DDT	Cancer	7
Dieldrin	Cancer	0.11
Endosulfan II	Toxicity	3700
Endrin aldehyde	Toxicity	180

Contaminant	Health Effect	Non-Residential Cleanup Level (mg/kg)
PCBs (total all PCBs)	Toxicity	14
Antimony	Toxicity	4100
Arsenic	Toxicity	440
Cadmium	Toxicity	450
Chromium	Cancer	450
Copper	Toxicity	41000
Lead	Toxicity	1218
Mercury	Toxicity	310
Selenium	Toxicity	5100
Silver	Toxicity	5100
Zinc	Toxicity	100000

PROPOSED UPRR OU2 FINAL CORRECTIVE MEASURES

The proposed corrective measures for UPRR OU2 are a combination of the corrective measures evaluated in the UPRR OU1 and UPRR OU2 Corrective Measures Studies (CMS) as follows:

EXCAVATION AND OFFSITE DISPOSAL

- Excavation of contaminated surface soil (soil from the ground surface to a minimum depth of one foot from the original elevation at the time of the UPRR OU2 RFI) above the corrective action objectives and backfill with clean soil to final development elevations. If the final development elevation will be below the original elevation at the time of the UPRR 2 RFI, soil will be removed to a minimum of one foot below the final development elevation and backfilled with clean soil.

- Excavation of subsurface soil exceeding the corrective action objectives to a depth of one foot below the depth of required construction wherever development requires subsurface construction.

- Disposal of all contaminated soil excavated from this point in time forward at an off-site landfill site approved by EPA. Note that previously lead contaminated soil from UPRR OU2 was excavated and disposed of onsite with lead contaminated soil excavated from UPRR OU1.[1]

[1] UPRR's implementation of corrective measures at OU1 included placement of contaminated soil into an onsite embankment used to construct Abbott Drive. In addition, UPRR excavated lead contaminated soil in OU2 as an interim measure and placed that soil with the soil excavated from OU1 in the same embankment. The contaminated

INSTITUTIONAL CONTROLS

- Institutional controls are legal mechanisms that restrict activities, uses, access, etc. to the facility or a portion of the facility to limit exposure to contamination. Institutional controls include but are not limited to a restrictive covenant pursuant to the Nebraska Uniform Environmental Covenant Act, Neb. Rev. Stat. § 76-2601 *et seq.* (Supp. 2005) to preserve the final corrective measures decision, to prevent disturbance of contaminated soil, to maintain protective barriers to prevent contact with contaminated soil and to provide for other restrictions to protect human health. City of Omaha zoning ordinances currently restrict use of the facility to heavy industrial uses.

LONG-TERM MONITORING AND MAINTENANCE

- Long-Term monitoring of the effectiveness of the institutional controls.

CORRECTIVE MEASURES EVALUATED FOR UPRR OU2

UPRR provided a CMS that focused on three potential corrective measures: "No Action," "Institutional Controls" and "Long-Term Monitoring and Maintenance." EPA has also included in this Statement of Basis an evaluation of "Excavation and Off-site Disposal" from the UPRR OU1 CMS. Each of these corrective measures can be implemented independently. However, EPA proposes that, with the exception of No Action, they all be used together at UPRR OU2. The discussion below summarizes the evaluation of these corrective measures.

No Action: The No Action corrective measure is evaluated to establish a baseline against which corrective measures can be compared. A No Action for UPRR OU2 would leave it "as is" with no additional excavation of contaminated soil required, no institutional controls and no monitoring or follow up if conditions change. A No Action corrective measure is justified in cases where no significant reduction of risk to human health or the environment is needed.

Excavation and Off-site Disposal: Soil with contamination above the cleanup levels will be excavated and disposed offsite. Specifically, surface soil with contamination above the cleanup levels will be excavated to a minimum depth of one foot below the ground surface (as the ground surface existed at the time of the RFI) and backfilled with clean soil. Soil with contamination above the cleanup levels in areas which will have subsurface construction will be excavated to a depth of at least one foot below the anticipated excavation depth or to a depth where soil contaminants are below the soil cleanup levels which ever is less and backfilled with clean soil. As described previously, lead contaminated soil in UPRR OU2 has been excavated and disposed onsite as an interim measure concurrent with soil excavations at UPRR OU1. The excavated soil will be tested to determine if they fail EPA's Toxicity Characteristic Leaching Procedure. Soil

soil from OU2 which was excavated and disposed with the soil from OU1 in the onsite embankment is proposed to remain in the embankment. See discussion later regarding this interim measure implemented by UPRR.

that fails the TCLP test is a hazardous waste and will be shipped off-site to a permitted hazardous waste landfill. Excavated soil that does not fail the TCLP test or is not otherwise a hazardous waste, i.e., a listed hazardous waste, can be disposed off-site at a permitted solid waste landfill.

Institutional Controls: The Institutional Controls corrective measure will ensure that changes in land use at the facility do not increase risks over the non-residential land use evaluated in the risk assessment which was used to determine the soil cleanup levels. Institutional controls are used to ensure the protection of human health and the environment from the risks of exposure to onsite contaminants in soil both from current and future uses of the facility. Institutional controls include, but are not limited to: deed restrictions, restrictive easements or covenants, local land use (zoning) restrictions. The institutional controls for UPRR OU2 evaluated include both existing zoning restrictions of industrial for the facility by the City of Omaha and a restrictive covenant pursuant to Nebraska's Uniform Environmental Covenants Act (UECA) to prevent disturbance of contaminated soil, to maintain protective barriers to prevent contact with contaminated soil and to provide for other restrictions to protect human health.

Long-Term Monitoring and Maintenance: The Long-Term Monitoring corrective measure is a required component of institutional controls. Annual inspection of the corrective measure is necessary to determine if property owners have complied with the restrictions on subsurface disturbances and ensure the integrity of the corrective measure. The site will be reviewed in order to determine that any construction or excavation has been in accordance with the restrictive covenant, the Order and local ordinances.

EVALUATION OF PROPOSED UPRR OU2 CORRECTIVE MEASURES

This section evaluates the performance of the proposed corrective measure described above against four general standards and five selection factors. The general standards are: overall protection, attainment of media cleanup standards, controlling the sources of releases, and compliance with waste management standards. These are threshold criteria that a corrective measure must meet. If the corrective measure cannot meet the general standards it is eliminated from further consideration. The selection factors are: long-term reliability and effectiveness, reduction of toxicity, mobility or volume of wastes, short-term effectiveness, implementability, and cost. A corrective measure is chosen that can meet the general standards based upon the selection factors. The following describes the evaluation of the corrective measure's ability to meet the general standards:

Overall Protection: Corrective measures must provide for the overall protection of human health and the environment.

The *No Action* corrective measure is a baseline measure evaluated to determine if any actions are required to protect human health and the environment. Since contaminants will remain in the soil at UPRR OU2 at levels that require land use restrictions, No Action does not provide for

overall protection of human health and the environment. No Action is therefore eliminated from further discussion below.

The *Excavation and Off-site Disposal* corrective measure provides overall protection by removing contaminated soil and disposing of contaminated soil off-site at a landfill that has a permit issued pursuant to the Solid Waste Disposal Act for non-hazardous waste disposal or, if the soil is a hazardous waste, at a landfill that has a permit issued pursuant to the Resource Conservation and Recovery Act for hazardous waste disposal. The requirement for off-site disposal in a permitted landfill provides for future protection of human health and the environment from soil contamination.

The *Institutional Controls* corrective measure provides overall protection of human health and the environment. Zoning and restrictive covenants restrict residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection.

The *Long-Term Monitoring and Maintenance* corrective measure provides overall protection by ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Attainment of Clean-up Standards: Corrective measures must meet the cleanup standards established as protective of human health and the environment by EPA.

The *Excavation and Off-site Disposal* corrective measure removes contaminated soil and disposes of it off-site at a landfill that has a solid waste or hazardous waste (as appropriate) disposal permit. The RFI shows that all contaminants in soil at UPRR OU2 can be excavated so that remaining contaminants in soil do not exceed the proposed cleanup levels. Note EPA's discussion of the proposed cleanup levels below.

The *Institutional Controls* corrective measure is an administrative requirement whose nexus to cleanup levels is restricting the current and future use of the facility. Zoning and restrictive covenants restrict residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection.

The *Long-Term Monitoring and Maintenance* corrective measure is an administrative requirement whose nexus to cleanup levels is ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Controlling Sources of Releases: Corrective measure must control the sources of releases to prevent future risks to human health and the environment.

The *Excavation and Off-site Disposal* corrective measure will control releases by removing contaminants from the site. The disposal of contaminated soil off-site at a permitted solid waste

or hazardous waste (as appropriate) disposal facility will provide protection from future releases of the contaminants removed.

The *Institutional Controls* corrective measure is an administrative requirement whose nexus to controlling sources of releases is restricting the current and future use of the facility. Zoning and restrictive covenants restrict residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection. The restrictive covenant will also restrict uses of the property which may generate hazardous wastes or otherwise manage hazardous wastes.

The *Long-Term Monitoring and Maintenance* corrective measure is an administrative requirement whose nexus to controlling sources of releases is ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Compliance with Waste Management Standards: Waste management standards are the federal and state regulations governing the management of solid and hazardous wastes.

The *Excavation and Off-site Disposal* corrective measure removes contaminated soil and disposes of it off-site at a landfill that has a solid waste or hazardous waste (as appropriate) disposal permit. Testing and other evaluation of the excavated soil will determine if disposal may occur in a solid waste landfill regulated pursuant to Subtitle D of the Solid Waste Disposal Act because it is non-hazardous or if disposal must occur in a hazardous waste landfill regulated pursuant to Subtitle C of the Solid Waste Disposal Act. In either case, the excavation and disposal of contaminated soil will be implemented in compliance with waste management standards.

The *Institutional Controls* corrective measure is an administrative requirement whose nexus to compliance with waste management standards is restricting the current and future use of the facility. Zoning and restrictive covenants restrict residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection. The restrictive covenant will also restrict uses of the property which may generate hazardous wastes or otherwise manage hazardous wastes.

The *Long-Term Monitoring and Maintenance* corrective measure is an administrative requirement whose nexus to compliance with waste management standards is ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Corrective measures that meet the four general standards above are evaluated further using the selection factors. EPA selects the corrective measures that provide the best balance in meeting the selection factors. The cost of implementing the corrective measures is used as a "tie-breaker"

when corrective measures are nearly equal in the other selection factors. The following describes the evaluation of the corrective measures using the selection factors:

Long-Term Reliability and Effectiveness: Corrective measures should continue to work after they have been implemented.

The *Excavation and Off-site Disposal* corrective measure will provide long-term reliability and effectiveness by preventing exposure to contaminated soil. Excavation will provide long-term reliability and effectiveness by removing contaminants from the facility which are a health risk. Off-site disposal will provide effectiveness as long as the disposal site is permitted for solid waste or hazardous waste disposal.

The *Institutional Controls* corrective measure provides long-term reliability and effectiveness of Excavation and Disposal by restricting residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection.

The *Long-Term Monitoring and Maintenance* corrective measure provides long-term reliability and effectiveness of Excavation and Disposal and Institutional Controls by ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Reduction of Toxicity, Mobility, or Volume of Wastes: Corrective measures should reduce the toxicity, mobility and/or volume of wastes.

The *Excavation and Off-site Disposal* corrective measure will not reduce the toxicity or volume of wastes. Treatment of contaminated soil (which is not part of EPA's proposed corrective measures) would be necessary to reduce the toxicity of soil contaminants or the volume of contaminated soil. The volume or toxicity of contaminated soil will not be reduced by excavation. Off-site disposal at a permitted solid waste or hazardous waste disposal facility will control the mobility of contaminated soil. EPA notes that certain treatment of hazardous wastes is required pursuant to 40 CFR Part 268 before it can be land disposed irrespective of the corrective measures proposed here.

The *Institutional Controls* corrective measure has the same limitations as Excavation and Off-site Disposal regarding the reduction of toxicity or volume of contaminated soil. Institutional Controls will reduce the mobility of contaminated soil by restricting residential and other uses of the property to ensure the assumptions used in EPA's selection of the cleanup levels continue to be valid thus providing overall protection.

The *Long-Term Monitoring and Maintenance* corrective measure has the same limitations as Excavation and Off-site Disposal regarding the reduction of toxicity or volume of contaminated soil. Long-Term Monitoring and Maintenance will reduce the mobility of contaminated soil by

ensuring the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Short-Term Effectiveness: Corrective measures must be able to control exposure to contaminants during their implementation. EPA does not want the cleanup of a site to present risks to human health or the environment that would not be in compliance with our National Contingency Plan.

The *Excavation and Off-site Disposal* corrective measure will provide short-term effectiveness with appropriate dust control during soil excavation, transportation and disposal.

The *Institutional Controls* corrective measure is effective as soon as the controls are in place. Institutional Controls ensure the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

The *Long-Term Monitoring and Maintenance* corrective measure is effective as soon as Institutional Controls are in place. Long-Term Monitoring and Maintenance ensure the corrective measures utilized will stay in place for as long as risks to human health and the environment need to be managed.

Implementability: Corrective measures may require special equipment which may not be available or have special operating requirements. Others may be experimental or have a limited history of implementation. Certain corrective measures are proprietary and have sole or limited sources of vendors.

The *Excavation and Off-site Disposal* corrective measure has been implemented widely at a variety of facilities. Standard construction equipment is all that is necessary to implement Excavation and Off-site Disposal. There are no licensing or vendor issues with Excavation and Off-site Disposal.

The *Institutional Controls* corrective measure has been implemented widely at a variety of facilities. There are no licensing or vendor issues with Institutional Controls.

The *Long-Term Monitoring and Maintenance* has been implemented widely at a variety of facilities. There are no licensing or vendor issues with Long-Term Monitoring and Maintenance.

Cost: EPA evaluates the cost of different corrective measures that provide a similar balance of the other selection factors above. A corrective measure may excel in one or more of the selection factors and may clearly be superior to the others. However, in many cases, the corrective measures evaluated may provide similar results from their evaluation against the selection factors. EPA then compares the costs to determine which corrective measures to propose. Evaluation of the costs of the *Excavation and Off-site Disposal* corrective measure was conducted previously in the UPRR OU1 CMS, UPRR OU1 Statement of Basis and UPRR OU1

Final Corrective Measures Decision. (see the Administrative Record for more detail) Based upon the UPRR OU2 RFI Report, EPA believes that Excavation and Off-site Disposal Excavation will be cost effective at UPRR OU2 as well. A cost estimate for Excavation and Off-site Disposal for UPRR OU2 has not been developed. EPA will require UPRR to provide this estimate to ensure adequate financial assurance is provided for Excavation and Off-Site Disposal. The UPRR OU2 CMS Report estimates the cost of implementing both the *Institutional Controls* and *Long-Term Monitoring and Maintenance* corrective measures as $54,596 for the first 15 years.

SUMMARY OF UPRR OU3 RISKS

A baseline risk assessment was conducted as part of the RCRA Facility Investigation (RFI) for UPRR OU3 to address the potential for adverse human health effects from exposure to chemicals in groundwater. The RFI did not include evaluation of future residential exposures based upon the assumption that no residential occupancy would occur. Restricted residential cleanup levels were included in the CMS for UPRR OU3. The following non-residential exposure scenarios were evaluated in the baseline risk assessment included in the RFI:

- Construction workers exposed to chemicals by incidental ingestion of contaminated groundwater, by dermal contact with contaminated groundwater, and by inhalation of chemical vapors released from contaminated groundwater.

- On-site workers and Recreational Users (referred to as Trespassers in the RFI) were not independently evaluated as their exposures would not be expected to be greater than construction workers.

Although many contaminants have been detected at UPRR OU3, only certain contaminants were evaluated in the risk assessment. These contaminants called "Contaminants of Potential Concern" (COPCs) were selected in the same manner as those found in soil at UPRR OU2 except the media being evaluated at UPRR OU3 was groundwater.

The risk assessment did not evaluate the SWMUs and AOCs in UPRR OU3 on an individual basis with the exception of the North and South Acetylene Sludge Pits (SWMU 20). Instead, each contaminant of concern was evaluated throughout UPRR OU3. The Acetylene Sludge Pits were specifically evaluated by the risk assessment. The risk assessment shows that only certain contaminants at UPRR are a potential health risk. The following provides information on current or potential health risks to human health from contaminants in groundwater at UPRR OU3 and separate summary of current or potential health risks to human health from contaminants in groundwater at the North and South Acetylene Sludge Pits (SWMU 20).

Construction Workers: This scenario predicts the risk to persons involved in subsurface construction activities for a maximum of 8 hours per day for 40 days during one year. The COPCs evaluated for groundwater have a combined estimated excess cancer risk of $4x10^{-7}$. The

potential exposure to subsurface groundwater has a HQ of 0.88. The risks to construction workers in this scenario are below EPA's target levels of $1x10^{-4}$ to $1x10^{-6}$ for cancer risks and below the target HQ of 1 for chemical toxicity.

At the North and South Acetylene Sludge Pits (SWMU 20), on-site worker exposure from contaminants was evaluated separately but utilized the same exposure factors of 8 hours per day for 40 days during one year. The COPCs evaluated for groundwater have a combined estimated excess cancer risk of $3x10^{-4}$. The potential exposure to subsurface groundwater has a HQ of 150. The risks to construction workers in this scenario are above EPA's target level of $1x10^{-4}$ for cancer risks and above the target HQ of 1 for chemical toxicity.

An ecological risk assessment was not conducted for UPRR OU3. The facility is located in an urban area and the proposed redevelopment of the facility for either non-residential use or restricted residential use would not be expected to provide significant habitat for wildlife. The facility is not likely to affect wildlife habitat which may be nearby. Long term monitoring is proposed as one of the corrective measures to determine if contaminants are being released to nearby wildlife habitat. If ongoing releases are found after implementation of the corrective measures, an ecological risk assessment will be required to determine what additional corrective measures and/or changes to corrective action objectives may be necessary.

The following table summarizes the soil contamination at UPRR OU3. For more detailed information please see the UPRR OU3 RFI Report in the Administrative Record.

Contaminant	UPRR OU3 RFI Groundwater Results excluding Acetylene Sludge Pits (µg/L)	UPRR OU3 RFI Groundwater Results at Acetylene Sludge Pits (µg/L)
Acetone	38.4	Not Detected
Benzene	0.8-94.2	0.58-69.1
n-Butylbenzene	1.4-49.9	Not Detected
sec-Butylbenzene	1.4-50.3	Not Detected
tert-Butylbenzene	1.1-9.1	Not Detected
Chlorobenzene	7.4-1150	142
Chloroethane	5.5	Not Detected
Chloroform	1.3-2.9	Not Detected
2-Chlorotoluene	4-123	Not Detected
4-Chlorotoluene	3.2-3490	Not Detected
1,2-Dichlorobenzene	19.5-23.4	206
1,1-Dichloroethene	5-32	2.3-93
cis-1,2-Dichloroethene	1.2-3530	4.4-147000

Contaminant	UPRR OU3 RFI Groundwater Results excluding Acetylene Sludge Pits (µg/L)	UPRR OU3 RFI Groundwater Results at Acetylene Sludge Pits (µg/L)
trans-1,2-Dichloroethene	1.2-200	10.9-2150
Ethylbenzene	2.7-37.2	Not Detected
Isopropylbenzene	1.3-68.6	Not Detected
p-Isopropyltoluene	1.6-3.4	Not Detected
Methylene Chloride	7.3-8.7	Not Detected
Methyl tertbutyl ether	1.1-49.9	Not Detected
Naphthalene	9.8-175	Not Detected
n-Proplybenzene	2.5-86.3	Not Detected
Tetrachloroethene	1.7-11100	103-198000
Toluene	3.5-6.7	Not Detected
1,1,1-Trichloroethane	6.8	Not Detected
Trichloroethylene	1.5-315	14.7-22300
1,2,4-Trimethylbenzene	2.1-138	Not Detected
1,3,5-Trimethylbenzene	2.4-24.9	Not Detected
Vinyl Chloride	1.2-1800	1.3-2840
Xylenes	3.5-105	Not Detected
Arsenic	8-393	90-250
Barium	90-7100	430-15000
Cadmium	2-30	Not Detected
Chromium	7-582	20-1320
Lead	4-2140	Not Detected
Mercury	0.38-2.46	0.76
Selenium	5	Not Detected

VAPOR INTRUSION FROM UPRR OU3 GROUNDWATER CONTAMINANTS

Certain organic chemicals easily evaporate even if they are adsorbed or contained in soil and groundwater. The resulting chemical vapors may enter into buildings used for residential, commercial or industrial occupancy. Occupants of residential, commercial or industrial buildings can be exposed to these vapors. If the concentrations of such vapors are high enough, they will cause adverse health effects. This pathway is commonly called "vapor intrusion" and will be referred to as such in the remainder of this document. Vapor intrusion is the entry of a specific type of contaminant, volatile organic compounds (VOCs), to indoor air from underlying contamination in soil and groundwater. VOCs readily disperse into air and even into the small air spaces within soil and underneath a structure.

The UPRR OU3 CMS Report includes an evaluation to determine groundwater target levels (GWTL) above which vapor intrusion would be a concern for human health. An EPA model (the Johnson and Ettinger Model) was used to develop the screening levels of VOCs in groundwater which may result in risk to the health of occupants of buildings located above contaminated soil and groundwater. The UPRR OU3 CMS studied the concentrations of volatile organic chemicals found in the groundwater at UPRR OU3 and at the North and South Acetylene Sludge Pits (SWMU 20). SWMU 20 was evaluated separately from the remainder of the groundwater at UPRR OU3 because of its higher levels of contamination and location.

Using the Johnson and Ettinger Model, GWTLs were calculated for constituents detected during the OU3 RFI. Benzene, tetrachloroethene, trichloroethylene, and vinyl chloride exceed the calculated GWTL for residences which could be located above groundwater contamination.

At the North and South Acetylene Sludge Pits (SWMU 20), benzene, cis-1,2-dichloroethene, tetrachloroethene, trichloroethylene, and vinyl chloride exceed the calculated GWTL for residences which could be located above groundwater contamination. Cis-1,2-dichloroethene, tetrachloroethene, trichloroethylene, and vinyl chloride also exceed the calculated GWTL for occupied commercial/industrial building which could be located above groundwater contamination.

PROPOSED UPRR OU3 GROUNDWATER CLEANUP LEVELS

Based upon the evaluation of groundwater contamination in the UPRR OU3 baseline risk assessment and the information from EPA's Johnson and Ettinger Model, EPA is proposing non-residential cleanup levels to allow for safe non-residential redevelopment of the site. It should be noted that non-residential development which may occur in areas that exceed the Johnson and Ettinger calculated groundwater target levels is prohibited unless those development projects include vapor mitigation measures to prevent potential human exposure to harmful levels of chemical vapors. The exact methods of construction and vapor mitigation will require EPA approval before the development can begin.

At the North and South Acetylene Sludge Pits (SWMU 20), groundwater contamination is such that no uses can currently occur in the area other than the rail lines which pass through the area. EPA is proposing a separate set of groundwater cleanup levels which, in addition to those proposed above for soil, when met will allow for construction activities to occur without extensive EPA review and approval. Due to the physical limitations for construction associated with the existing active railroad tracks and rail yard, EPA believes that the only construction activities which may occur here are associated with maintenance of the railroad infrastructure or public utilities.

The cleanup levels are calculated to meet the requirements of EPA's National Contingency Plan and to protect human health. For carcinogenic contaminants, the non-residential use cleanup levels are proposed at a target excess cancer risk of $1x10^{-5}$. A target risk of $1x10^{-5}$ is the mid-

point of EPA's range of $1x10^{-4}$ to $1x10^{-6}$ for cancer risks. EPA believes that this provides an adequate level of protection for occupational workers in UPRR OU3 because of site specific factors. For non-carcinogenic contaminants, the non-residential use cleanup levels are based upon a HQ of 1.

PROPOSED NON-RESIDENTIAL GROUNDWATER CLEANUP LEVELS

Contaminant	Vapor Intrusion Non-Residential GW Cleanup Level (µg/L)
Benzene	408
n-Butylbenzene	14,000
tert-Butylbenzene	13,707
Chlorobenzene	12,852
Chloroethane	823
Chloroform	170
1,2-Dichlorobenzene	82,380
1,1-Dichloroethene	4,689
cis-1,2-Dichloroethene	5,694
trans-1,2-Dichloroethene	5,568
Ethylbenzene	261
Isopropylbenzene	518
Methylene Chloride	11,662
Methyl tertbutyl ether	15,500,600
Naphthalene	2,679
n-Proplybenzene	16,674
Tetrachloroethene	488
Trichloroethylene	19
1,2,4-Trimethylbenzene	1,368
1,3,5-Trimethylbenzene	1,173
Vinyl Chloride	54
Xylenes	178,000

PROPOSED GROUNDWATER CLEANUP LEVELS FOR SUBSURFACE CONSTRUCTION ACTIVITIES AT THE NORTH AND SOUTH ACETYLENE SLUDGE PITS (SWMU 20)

Contaminant	Subsurface Construction GW Cleanup Level (µg/L)
Benzene	70
Chlorobenzene	285
cis-1,2-Dichloroethene	19,548
1,4-Dioxane	30
Tetrachloroethene	1,719
Trichloroethylene	62
Vinyl Chloride	230
Metals	
Barium	14,234
Chromium	598

PROPOSED UPRR OU3 FINAL CORRECTIVE MEASURES

The proposed corrective measures for UPRR OU3 are a combination of the corrective measures evaluated in the Corrective Measures Study (CMS) for UPRR OU3 and by EPA as follows:

NATURAL ATTENUATION

- Natural Attenuation of groundwater contaminants.

LONG-TERM GROUNDWATER MONITORING

- Long-Term monitoring of contaminants in the groundwater to document the effectiveness of natural attenuation.

VAPOR INTRUSION MITIGATION

- Vapor Intrusion Mitigation to control VOC contaminants in structures (see table below of presumptive measures any or all of which may be employed depending on the specifics of each building) where structures are located above contaminated soil or groundwater.

LONG-TERM MONITORING OF VAPOR INTRUSION CONTAMINANTS

- Long-Term monitoring of vapor intrusion contaminants in structures and subsurface soil vapor and in groundwater.

INSTITUTIONAL CONTROLS

- Institutional controls are legal mechanisms that restrict activities, uses, access, etc. to the facility or a portion of the facility to limit exposure to contamination. Institutional controls include but are not limited to a restrictive covenant pursuant to the Nebraska Uniform Environmental Covenant Act, Neb. Rev. Stat. § 76-2601 *et seq.* (Supp. 2005) to preserve the final corrective measures decision, to prevent extraction of contaminated groundwater, to maintain protective barriers to prevent exposure to groundwater contaminants, to provide for other restrictions to protect human health. City of Omaha municipal ordinance prohibits the installation of private groundwater wells to supply drinking water.

LONG-TERM MONITORING AND MAINTENANCE

- Long-Term monitoring of the effectiveness of the institutional controls.

CORRECTIVE MEASURES EVALUATED FOR UPRR OU3

UPRR provided a CMS that focused on five potential corrective measures: "No Action," "Natural Attenuation," "Long-Term Groundwater Monitoring," "Institutional Controls" and "Long-Term Monitoring and Maintenance." In addition, EPA is including an evaluation of "Vapor Intrusion Mitigation" to control vapor intrusion contaminants in structures and "Long-Term Monitoring of Vapor Intrusion Contaminants" in structures and subsurface. Each of these corrective measures can be implemented independently. EPA proposes that, with the exception of No Action, they all be used together at UPRR OU3. The discussion below summarizes the evaluation of these corrective measures.

No Action: The No Action corrective measure is evaluated to establish a baseline for comparison to other corrective measures. A No Action corrective measure does not include any remedial action, institutional controls or long-term monitoring.

Natural Attenuation: The Natural Attenuation corrective measure encompasses a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

Long-Term Groundwater Monitoring: The Long-Term Groundwater Monitoring (LTM) corrective measure is a required component of the Natural Attenuation proposed above. LTM is designed to collect groundwater contaminant concentration data on a periodic basis to determine if contaminant concentrations are increasing or are decreasing. If LTM shows contaminant concentrations are increasing, EPA will evaluate whether changes to the corrective measure or a new corrective measure is necessary.

Vapor Intrusion Mitigation: The Vapor Intrusion Mitigation corrective measure will provide a menu of actions that can be taken to minimize or eliminate exposure to chemical vapors from contaminated groundwater beneath UPRR OU3. Source removal is the most thorough way to prevent a vapor intrusion problem. However, source removal may not address immediate risks, be cost effective, be well suited to site redevelopment, or be possible. At sites where the source of contamination cannot be completely eliminated, other solutions to vapor intrusion problems can be implemented. As a presumptive remedy, EPA is proposing mitigation of vapor intrusion using the technologies in the table below. These technologies may be used singly or in combination as the situation dictates for both new buildings and existing buildings constructed where groundwater or soil gas shows the potential for adverse health effects from vapor intrusion. All new buildings constructed where groundwater or soil gas shows the potential for adverse health effects from vapor intrusion will at a minimum include passive barriers, passive venting and sealing the building envelope.

PRESUMPTIVE VAPOR MITIGATION TECHNOLOGIES

Technology	Typical applications	Challenges	Range of installed costs*
Passive Barrier	• New construction • Crawl spaces • Often combined with passive or active venting, sealing openings in the slab, drains, etc.	• Preventing tears, holes • May not suffice as a stand-alone technology • Ensuring caulking seals cracks in floors, etc. • Thinner, less-expensive barriers likely to be inadequate	• \$0.50–\$5/ft^2
Passive Venting	• New construction • Low soil gas flux sites • Should be convertible to active system if necessary	• Relies on advective flow of air due to wind and heat stack effects • Air flows and suction typically far less than achieved by fans	• \$0.75–\$5/ft^2
Subslab Depressurization (SSD)	• New and existing structures • Sumps, drain tiles, and block wall foundations may also be depressurized if present	• Low permeability and wet soils may limit performance	• \$1–\$5/ft^2 • Residential systems typically in the \$1–\$2/ft^2 range
Submembrane Depressurization	• Existing structures • Crawl spaces	• Sealing to foundation wall, pipe penetrations • Membranes may be damaged by occupants or trades people accessing crawl space	• \$1–\$6/ft^2 • Residential systems typically in the \$1.50–\$2/ft^2 range
Subslab Pressurization	• Same as SSD • Most applicable to highly permeable soils	• Higher energy costs and less effective than SSD • Potential for short-circuiting through cracks	• \$1–\$5/ft^2

Technology	Typical applications	Challenges	Range of installed costs*
Building Pressurization	• Large non-residential structures, new or existing • Sensitive receptors	• Requires regular air balancing and maintenance • May not maintain positive pressure when building is unoccupied	• $1–$15/ft^2 • Heavily dependent on size and complexity of structure
Indoor Air Treatment	• Specialized cases only	• Typically generates a waste disposal stream • Effective capture of air contaminants may be difficult • Energy-intensive, with significant operation, maintenance, and monitoring burden	• $15K–$25K per application not atypical • Actual costs heavily dependent upon type of technology employed
Sealing the Building Envelope	• Cracks and holes in existing buildings	• Access to perforations • Permanence	• Highly dependent on the extent of sealing required

*Square footage costs based on building footprint.

Long-Term Monitoring of Vapor Intrusion Contaminants: The Long-Term Monitoring of Vapor Intrusion Contaminants corrective measure is a required component of the Vapor Intrusion Mitigation proposed above. The Long-Term Monitoring of Vapor Intrusion Contaminants includes, as appropriate, groundwater monitoring, soil vapor monitoring and/or monitoring of vapors in building interiors on a periodic basis to determine if contaminant concentrations are present, increasing or decreasing. If information shows organic vapor contaminant concentrations are present above health based levels or are increasing, EPA will evaluate whether changes to the corrective measure or a new corrective measure is necessary.

Institutional Controls: The Institutional Controls corrective measure will limit development projects to those non-residential developments where groundwater contamination will not be a risk to human health either from exposure to the contaminated groundwater itself or from vapor intrusion. Institutional controls will be used to ensure the protection of human health and the environment from the risks of exposure to onsite contaminants in groundwater both from current and future uses of the facility. The Institutional Controls include, but are not limited to: deed restrictions, restrictive easements or covenants, local land use (zoning) restrictions. The proposed Institutional Controls for UPRR OU3 evaluated include both the current zoning restrictions by the City of Omaha and a restrictive covenant pursuant to Nebraska's Uniform Environmental Covenants Act (UECA) to restrict residential and other uses of the property.

Long-Term Monitoring and Maintenance: The Long-Term Monitoring corrective measure is a required component of the Institutional Controls proposed above. Annual inspection of the

corrective measure is necessary to determine if property owners have complied with the restrictions on groundwater use and ensure the integrity of the corrective measure. The site will be reviewed in order to determine that any construction or excavation has been in accordance with the restrictive covenant, the Order and local ordinances.

EVALUATION OF PROPOSED UPRR OU3 CORRECTIVE MEASURES

This section provides a summary of the evaluation of the proposed UPRR OU3 corrective measures described above against EPA's general standards and selection factors for corrective measures. EPA has four general standards that corrective measures must achieve. These general standards are: overall protection, attainment of media cleanup standards (called cleanup levels in this Statement of Basis), controlling the sources of releases, and compliance with waste management standards. These are threshold criteria that a corrective measure must meet. If the corrective measure cannot meet a general standard it is eliminated from further consideration. EPA also has five selection factors to choose between those corrective measures which meet the general standards. The selection factors are: long-term reliability and effectiveness, reduction of toxicity, mobility or volume of wastes, short-term effectiveness, implementability, and cost. The following summarizes the evaluation of the corrective measures.

Overall Protection: Corrective measures must provide for the overall protection of human health and the environment.

The *No Action* corrective measure is a baseline measure evaluated to determine if any action is required to protect human health and the environment. Since contaminants exist in the UPRR OU3 groundwater above levels that are protective of human health and the environment for unrestricted use, No Action does not meet the general standard of overall protection. The discussion that follows does not include further evaluation of the No Action corrective measure as it does not meet the general standard of overall protection.

The *Natural Attenuation* corrective measure provides overall protection through the reduction in the concentrations of groundwater contaminants through natural processes. Contaminants in groundwater are expected to eventually reduce in concentration below the groundwater cleanup levels established in this Statement of Basis as protective of non-residential exposure due to vapor intrusion of volatile organic chemicals and for construction workers.

The *Long-Term Groundwater Monitoring* corrective measure is a required component of the Natural Attenuation corrective measure. It does not protect human health from contaminated groundwater by itself. However, when used with Natural Attenuation, it contributes to overall protection from exposure to contaminated groundwater by identifying areas that must be restricted from construction, provides early warning in order to take other corrective measures to eliminate, reduce or control risks from contaminated groundwater and monitors the progress of Natural Attenuation.

The *Vapor Intrusion Mitigation* corrective measure provides overall protection by minimizing or eliminating exposure to chemical vapors to building occupants from contaminated soil or groundwater beneath UPRR OU3.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure is a required component of the Vapor Intrusion Mitigation corrective measures. It does not protect human health from chemical vapors by itself. However, when used with Vapor Intrusion Mitigation, it contributes to overall protection from chemical vapors by identifying areas where buildings (either existing or new construction) must be provided with Vapor Intrusion Mitigation, provides early warning in order to take other corrective measures for chemical vapors which may migrate into occupied structures and monitors the progress of Natural Attenuation.

The *Institutional Controls* corrective measure provides overall protection of human health and the environment. Zoning and restrictive covenants restrict development to non-residential development projects and in the case of the North and South Acetylene Sludge Pits (SWMU 20) restricts construction entirely.

The *Long-Term Monitoring and Maintenance* corrective measure is a required component of the Institutional Controls corrective measure. It does not protect human health from inappropriate construction itself. However, when used with Institutional Controls, it ensures that Institutional Controls are effective to limit development to non-residential projects.

Attainment of Clean-up Standards: Corrective measures must meet the cleanup levels proposed in this Statement of Basis which are protective of human health and the environment.

The *Natural Attenuation* corrective measure is expected to attain the cleanup levels established in this Statement of Basis as protective of human health and the environment by EPA. Contaminants in groundwater are expected to eventually reduce in concentration below the groundwater cleanup levels established in this Statement of Basis for vapor intrusion and construction workers.

The *Long-Term Groundwater Monitoring* corrective measure does not contribute actively to the attainment of cleanup standards. It is necessary in conjunction with Natural Attenuation to monitor the progress of Natural Attenuation and to determine when cleanup levels have been achieved.

The *Vapor Intrusion Mitigation* corrective measure does not contribute actively to the attainment of cleanup standards. Vapor Intrusion Mitigation is necessary in conjunction with Natural Attenuation to eliminate, reduce or control risks from exposure to chemical vapors which may migrate into occupied structures until the groundwater cleanup levels have been achieved through Natural Attenuation.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure does not contribute actively to the attainment of cleanup standards. Long-Term Monitoring of Vapor Intrusion Contaminants is necessary in conjunction with Vapor Intrusion Mitigation to identify areas that must be restricted from certain uses or to provide early warning in order to take other corrective measures to eliminate, reduce or control risks from chemical vapors which may migrate into occupied structures.

The *Institutional Controls* corrective measure does not contribute actively to the attainment of cleanup standards. The proposed Institutional Controls are necessary in conjunction with Natural Attenuation to prevent exposure to contaminated groundwater by prohibiting non-residential uses of the facility and in the case of the North and South Acetylene Sludge Pits (SWMU 20) to prevent all construction activities where groundwater exceeds the proposed cleanup levels. The proposed Institutional Controls also require the use of Vapor Intrusion Mitigation to protect the occupants of buildings where there is human health risk from chemical vapors due to contaminated soil or groundwater.

The *Long-Term Monitoring and Maintenance* corrective measure does not contribute actively to the attainment of cleanup standards. Long-Term Monitoring and Maintenance is necessary in conjunction with Institutional Controls to limit development to non-residential development and to ensure that Vapor Intrusion Mitigation is used where there is human health risk from chemical vapors due to contaminated soil or groundwater.

Controlling Sources of Releases: Corrective measures must control the sources of releases to prevent future risks to human health and the environment. Groundwater has been contaminated from releases of hazardous constituents into the environment. UPRR no longer operates an overhaul and repair facility and therefore the releases which occurred over the history of its operation will no longer take place. The corrective measures previously selected for UPRR OU1, the corrective measures proposed in this Statement of Basis for UPRR OU2 and the UPRR Interim Measures (discussed below) removed contaminated soil which was or which is a source of groundwater contamination.

The proposed corrective measures for UPRR OU3 in conjunction with those completed for UPRR OU1, the completed UPRR Interim Measures and the corrective measures proposed for UPRR OU2 will protect human health from contaminated groundwater. The *Natural Attenuation* corrective measure will over time reduce the concentrations of groundwater contaminants below the UPRR OU3 cleanup levels. Based upon the information in the UPRR OU3 RFI and CMS, groundwater contamination concentrations have significantly reduced in the area of the North and South Acetylene Sludge Pits (SWMU 20) after the interim measure of contaminated soil removal was completed.

Compliance with Waste Management Standards: Waste management standards are the federal and state regulations governing the management of solid and hazardous wastes.

The *Natural Attenuation* corrective measure does not generate a waste that requires management in accordance with federal and state regulations.

The *Long-Term Groundwater Monitoring* corrective measure does result in the generation of potentially contaminated water and other solid wastes from groundwater sampling or contaminated soil during monitoring well construction. These wastes can be managed in accordance with state and federal regulations.

The *Vapor Intrusion Mitigation* corrective measure does not generate a waste that requires management in accordance with federal and state regulations.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure does result in the generation of solid wastes which can be managed in accordance with state and federal regulations.

The *Institutional Controls* corrective measure does not generate a waste that requires management in accordance with federal and state regulations.

The *Long-Term Monitoring and Maintenance* corrective measure does not generate a waste that requires management in accordance with federal and state regulations.

Corrective measures that meet the four general standards above are evaluated further using the selection factors. EPA selects the corrective measures that provide the best balance in meeting the selection factors. The cost of implementing the corrective measures is used as a "tie-breaker" when corrective measures are nearly equal in the other selection factors. The following describes the evaluation of the corrective measures using the selection factors:

Long-Term Reliability and Effectiveness: Corrective measures should continue to work after they have been implemented.

The *Natural Attenuation* corrective measure relies upon natural existing physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. Because these processes work and will continue to work without any human intervention, Natural Attenuation has Long-Term Reliability and Effectiveness.

The *Long-Term Groundwater Monitoring* corrective measure can be implemented such that it provides Long-Term Reliability and Effectiveness. EPA will require UPRR to submit and will review and approve a Long-Term Groundwater Monitoring Plan that uses suitable methods and techniques of groundwater monitoring that will provide reliable data to monitor the migration of groundwater contamination and the performance and effectiveness of Natural Attenuation.

The *Vapor Intrusion Mitigation* corrective measure uses proven methods and techniques to limit the intrusion of chemical vapors into buildings and will mitigate concentrations of chemical vapors which enter buildings. The proposed Vapor Intrusion Mitigation technologies will provide Long-Term Reliability and Effectiveness against human health risks from vapor intrusion.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure can be implemented such that it provides Long-Term Reliability and Effectiveness. EPA will require UPRR to submit and will review and approve a Long-Term Vapor Intrusion Monitoring Plan that uses suitable methods and techniques for monitoring vapor intrusion contaminants that will provide reliable data to monitor the need for and the effectiveness of Vapor Intrusion Mitigation.

The *Institutional Controls* corrective measure relies upon legal mechanisms to limit uses of UPRR OU3 to non-residential uses. Institutional Controls will provide Long-Term Reliability and Effectiveness in conjunction with the other UPRR OU3 proposed corrective measures.

The *Long-Term Monitoring and Maintenance* corrective measure can be implemented such that it provides Long-Term Reliability and Effectiveness. EPA will require UPRR to submit and will review and approve a Long-Term Monitoring and Maintenance Plan that uses suitable methods and techniques to review the Institutional Controls and demonstrate their continued effectiveness.

Reduction of Toxicity, Mobility, or Volume of Wastes: Corrective measures should reduce the toxicity, mobility and/or volume of wastes.

The *Natural Attenuation* corrective measure is expected to attain the cleanup standards established as protective of human health and the environment by EPA. Contaminants in groundwater are expected to eventually reduce in concentration below the groundwater cleanup levels and be reduced in volume.

The *Long-Term Groundwater Monitoring* corrective measure does not contribute actively to the reduction of toxicity, mobility or volume of wastes. It is a necessary compliment to Natural Attenuation to determine when cleanup levels have been achieved.

The *Vapor Intrusion Mitigation* corrective measure does not contribute actively to the reduction of toxicity, mobility or volume of wastes. It is a necessary compliment to Natural Attenuation to eliminate, reduce or control risks from exposure to chemical vapors which may migrate into occupied structures until the groundwater cleanup levels have been achieved through Natural Attenuation.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure does not contribute actively to the reduction of toxicity, mobility or volume of wastes. It is a necessary compliment to Vapor Intrusion Mitigation to identify areas that must be restricted from certain

uses or to provide early warning in order to take other corrective measures to eliminate, reduce or control risks from chemical vapors which may migrate into occupied structures.

The *Institutional Controls* corrective measure does not contribute actively to the reduction of toxicity, mobility or volume of wastes. It is a necessary compliment to Natural Attenuation to prevent exposure to contaminated groundwater by prohibiting certain uses of the facility where the risk from exposure to contaminated groundwater exceeds EPA's guidelines.

The *Long-Term Monitoring and Maintenance* corrective measure does not contribute actively to the reduction of toxicity, mobility or volume of wastes. It is a necessary compliment to Institutional Controls to ensure that use restrictions required by the Institutional Controls remain in place.

Short-Term Effectiveness: Corrective measures must be able to control exposure to contaminants during their implementation. EPA does not want the cleanup of a site to present risks to human health or the environment that would not be in compliance with our National Contingency Plan.

The *Natural Attenuation* corrective measure does not result in any short term exposures which would be harmful to human health or the environment. Exposure to possible contaminated groundwater will be controlled through Institutional Controls.

The *Long-Term Groundwater Monitoring* corrective measure could result in short term exposure of groundwater sampling personnel to hazardous constituents. Testing of the atmosphere within the well and personnel protective equipment are utilized by sampling personnel to prevent harmful exposures to hazardous constituents.

The *Vapor Intrusion Mitigation* corrective measure minimizes or eliminates exposures to chemical vapors in structures to protect human health and the environment.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure could result in short term exposure of sampling personnel to hazardous constituents. Testing of the atmosphere in enclosed spaces and personnel protective equipment are utilized by sampling personnel to prevent harmful exposures to hazardous constituents.

The *Institutional Controls* corrective measure does not result in any short term exposures which would be harmful to human health or the environment. It is a necessary compliment to Natural Attenuation to prevent exposure to contaminated groundwater by prohibiting certain uses of the facility where the risk from exposure to contaminated groundwater exceeds EPA's guidelines.

The *Long-Term Monitoring and Maintenance* corrective measure does not result in any short term exposures which would be harmful to human health or the environment.

Implementability: Corrective measures may require special equipment which may not be available or have special operating requirements. Others may be experimental or have a limited history of implementation. Certain corrective measures are proprietary and have sole or limited sources of vendors.

The *Natural Attenuation* corrective measure has been implemented at a variety of facilities. Standard construction equipment is all that is necessary to implement Natural Attenuation. There are no licensing or vendor issues with Natural Attenuation.

The *Long-Term Groundwater Monitoring* corrective measure has been implemented at a variety of facilities. Standard sampling and construction equipment is all that is necessary to implement Long-Term Groundwater Monitoring. There are no licensing or vendor issues with Long-Term Groundwater Monitoring.

The *Vapor Intrusion Mitigation* corrective measure has been implemented at a variety of facilities. Standard construction equipment is all that is necessary to implement Vapor Intrusion Mitigation. There are no licensing or vendor issues with Vapor Intrusion Mitigation.

The *Long-Term Monitoring of Vapor Intrusion Contaminants* corrective measure has been implemented at a variety of facilities. Standard sampling equipment is all that is necessary to implement Long-Term Monitoring of Vapor Intrusion Contaminants. There are no licensing or vendor issues with Long-Term Monitoring of Vapor Intrusion Contaminants.

The *Institutional Controls* corrective measure has been implemented at a variety of facilities. There are no licensing or vendor issues with Institutional Controls.

The *Long-Term Monitoring and Maintenance* corrective measure has been implemented at a variety of facilities. There are no licensing or vendor issues with Long-Term Monitoring and Maintenance.

Cost: EPA evaluates the cost of different corrective measures that provide a similar balance of the other selection factors above. A corrective measure may excel in one or more of the selection factors and may clearly be superior to the others. However, in many cases, the corrective measures evaluated may provide similar results from their evaluation against the selection factors. EPA then compares the costs to determine which corrective measures to propose.

The UPRR OU3 CMS Report estimates the cost of implementing the *Natural Attenuation, Long-Term Groundwater Monitoring* and the associated *Institutional Controls* at $403,740 for the first 5 years. The cost of *Vapor Intrusion Mitigation* is dependent on the size of the structure and the method being employed. EPA has provided estimates of unit costs in the table above included in the discussion of Vapor Intrusion Mitigation. The cost of *Long-Term Monitoring of Vapor*

Intrusion Contaminants has not been specifically estimated but is comparable to that of groundwater monitoring.

DISCUSSION OF PREVIOUS UPRR ACTIONS COMPLETED AS INTERIM MEASURES

Interim measures are short-term actions taken to mitigate the actual release or the threat of a potential release of hazardous waste or hazardous waste constituents from a facility. Generally, interim measures are conducted while developing a long-term comprehensive corrective action strategy. They may encompass a wide range of possible actions, including: actions to control the source or potential source of a release, actions to control the migration of a release, and actions to minimize exposure to the release. Any interim measure should, to the extent practicable, be consistent with, and contribute to, the performance of any corrective measure that may be conducted as part of the long-term corrective-action strategy.

The principal differences between interim measures and corrective measures are the periods during which each is conducted and the nature of the protection of human health and the environment each provides. An interim measure is intended to be implemented in the short term, usually within a few days or months, and is intended to prevent or mitigate an immediate or short-term threat posed by an actual or potential release of a hazardous waste or hazardous waste constituent. Corrective measures are intended to provide the permanent solution to the long-term threats posed by an actual or potential release of hazardous waste or hazardous waste constituents.

There are several instances when an interim measure should be implemented. EPA will require interim measures whenever there is a significant immediate threat posed by release of hazardous wastes or hazardous waste constituents where implementation of a corrective measure is unlikely in the near future. EPA required UPRR in the Order to conduct an interim measure. The interim measure required was to continue to operate a free phase product recovery system to remove diesel fuel which had leaked or been spilled from their locomotive refueling. However, an interim measure should also be considered by the facility owner or operator as a voluntary short-term action in situations where there is no significant immediate threat posed by release of hazardous wastes or hazardous waste constituents but where implementation of a corrective measure is unlikely in the near future. In these cases, it is important to consider the general performance standards and specific decision factors for a corrective measure to ensure that the interim measure is consistent with, and will contribute to, the performance of any corrective measure conducted as part of the long-term corrective action strategy.

For each interim measure implemented by UPRR, the following discussion provides information on the scope of the interim measure.

UNDERGROUND STORAGE TANK REMOVAL

During construction of the Qwest Center an underground storage tank (UST) was found while excavating for a sanitary sewer along the 12th Street right-of-way. The UST was located near the intersection of 12th and Webster. The tank was determined to be a 6,800 gallon rail tank car. The UST was removed along with approximately 4,000 cubic yards of soil contaminated with gasoline. The removal and closure of the tank was reported to the Nebraska Department of Environmental Quality.

For more detail on this interim measure see the letter dated December 31, 2001 in the Administrative Record.

The activities undertaken by UPRR as an interim measure for the UST are consistent with, and will contribute to, the performance of EPA's proposed UPRR OU2 and UPRR OU3 corrective measures.

ASBESTOS INTERIM MEASURE

Asbestos was identified by UPRR as being present in the soil from various overhaul and rail car maintenance activities. Asbestos was excavated in areas where the soil concentration was greater than 1% asbestos. Five areas of asbestos contamination were excavated in the summer of 2000.

Approximately 41,500 cubic yards of asbestos containing soil was trucked to the Butler County landfill where it was disposed. Approximately 5,000 cubic yards of asbestos containing soil was included in the onsite soil repository constructed under the new Abbott Drive/Cuming Street roadway embankment.

For more detail on this interim measure see the "Asbestos Area Interim Measures Planning Memorandum" (2000) and the "Asbestos Interim Measures Completion Report" (2001) in the Administrative Record.

The activities undertaken by UPRR as an interim measure for asbestos are consistent with, and will contribute to, the performance of EPA's proposed UPRR OU2 corrective measures and UPRR OU3 corrective measures.

UPRR OU2 LEAD CONTAMINATED SOIL INTERIM MEASURE

UPRR conducted corrective measures to remove lead contaminated soil from UPRR OU1 and to place the removed soil into an onsite soil repository constructed under the new Abbott Drive/Cuming Street roadway embankment. Lead contaminated soil above the UPRR OU1 cleanup level of 1,218 mg/kg was identified in UPRR OU2 during the course of the UPRR OU2 RFI.

Although soil contamination at UPRR was separated into operable units (UPRR OU1 and UPRR OU2) for convenience and to support the redevelopment of part of the facility as the Qwest Center, UPRR proposed as an interim measure the removal of lead contaminated soil above the UPRR OU1 cleanup level of 1,218 mg/kg in UPRR OU2 as it was identified in the course of the UPRR OU2 RFI at the same time corrective measures were being implemented at UPRR OU1. The UPRR OU2 lead contaminated soil removed contemporaneously with the UPRR OU1 lead contaminated soil would be placed into the same onsite soil repository being constructed for UPRR OU1 under the new Abbott Drive/Cuming Street roadway embankment. The removal of contaminated soil from UPRR OU2 and its subsequent onsite disposal into the soil repository was conducted in the same manner as the soil excavation and disposal implemented for UPRR OU1 during July 2000. Approximately 1,575 cubic yards of lead contaminated soil was excavated and placed into the soil repository established for UPRR OU1 in the new Abbott Drive/Cuming Street roadway embankment.

For more detail on this interim measure see the technical memorandum "OU2 Interim Measures" dated April 2, 2007, in the Administrative Record.

The activities undertaken by UPRR as an interim measure to remove lead contaminated soil at UPRR OU2 was conducted in accordance with the approved corrective measures for UPRR OU1. The removal of lead contaminated soil at UPRR OU2 is consistent with, and will contribute to, the performance of EPA's UPRR OU2 and UPRR OU3 corrective measures.

PAINT BARREL PITS (SWMU 14) INTERIM MEASURE

The Paint Barrel Pits (SWMU 14) consists of an area near 12th and Izard Streets and was identified from historical facility blueprints by UPRR. The area was reportedly used for the disposal of empty paint drums and paint waste. Two pits were located by subsurface investigations by UPRR. The West Pit was 30 feet by 120 feet and 7 feet deep. The East Pit was 30 feet by 90 feet and 7 feet deep.

Excavation of the pits and materials within them was completed in the summer of 2000. Approximately 7,000 cubic yards of contaminated materials which were not a hazardous waste were trucked to the Butler County landfill where the materials were disposed.

For more detail on this interim measure see the "Paint Barrel Pits Interim Measures Planning Memorandum" (2000) and the "Paint Barrel Pits Interim Measures Completion Report" (2001) in the Administrative Record.

The activities undertaken by UPRR as an interim measure at SWMU 14 Paint Barrel Pits are consistent with, and will contribute to, the performance of EPA's UPRR OU2 and UPRR OU3 corrective measures.

DIESEL FUEL INTERIM MEASURE

Free phase hydrocarbons, diesel fuel in this case, were found in the subsurface during the construction of the Abbott Drive overpass. The diesel fuel was released from fueling and de-fueling of locomotives and/or from leaks in the subsurface pipeline from the fuel storage tanks.

In 1988, UPRR completed construction of a remedial system to intercept, remove and treat contaminated groundwater and recover free-phase hydrocarbons, pursuant to Stipulation for Entry of Schedule of Compliance No. 1468, Nebraska Department of Environmental Quality, dated August 4, 1992. This system has removed as much as 1,000 gallons of diesel fuel per month at its peak and as of March, 1998, a total of 68,856 gallons of diesel fuel had been recovered. This system was removed for the construction of the Qwest Center in 2000.

To complete the required removal of the diesel fuel and to eliminate the need for continued operation of the free product recovery system, UPRR excavated contaminated soil and removed diesel fuel liquids encountered during excavation in the summer of 2000. Approximately 82,300 cubic yards of soil was excavated and trucked to the Butler County landfill where the soil was disposed.

For more detail on this interim measure see the "Free Phase Recovery Area Remedial Action Completion Report" (2001) in the Administrative Record.

The activities undertaken by UPRR as an interim measure for free phase hydrocarbons are consistent with, and will contribute to, the performance of EPA's UPRR OU2 and UPRR OU3 corrective measures.

NORTH AND SOUTH ACETYLENE SLUDGE PITS (SWMU 20) INTERIM MEASURE

The North and South Acetylene Sludge Pits (SWMU 20) are located at the northeastern portion of the UPRR facility. The pits were utilized for the disposal of calcium carbide sludge from UPRR's production of acetylene gas for use in the overhaul and maintenance of locomotives and rail cars. Samples of the materials in the pits showed the presence of solvent wastes as well.

As part of the construction of the Qwest Center, a railroad track serving the power plant north of the UPRR facility and a rail classification yard at the UPRR facility needed to be relocated. In order to accomplish the relocation of the rail line and rail classification yard, portions of both the North and South Acetylene Sludge Pits required removal. UPRR submitted an interim measure work plan for the removal of the contaminated materials in the pits. Materials were removed in two phases, the first of which was completed in the summer of 2000, and the remaining contaminated materials removed in the spring of 2002.

Approximately 4,823 tons of soil contaminated with hazardous waste were shipped by rail for incineration at a hazardous waste facility in Texas. Approximately 810 tons of soil contaminated with hazardous waste were shipped to a hazardous waste landfill in Oklahoma where they were

disposed. Approximately 1,640 tons of materials which were not hazardous wastes were shipped by truck for disposal at the Butler County landfill where they were disposed.

For more detail on this interim measure see the "Acetylene Sludge Pits Interim Measures Planning Memorandums" (2000 and 2002) and the "Acetylene Sludge Pits Interim Measures Completion Report" (2002) in the Administrative Record.

The activities undertaken by UPRR as an interim measure at SWMU 20 North and South Acetylene Sludge Pits are consistent with, and will contribute to, the performance of EPA's UPRR OU2 and UPRR OU3 corrective measures.

UNION PACIFIC PLACE INTERIM MEASURE

UPRR proposed to transfer the property from 12th to 14th Streets and Cuming to Izard Streets to a developer who proposed to construct two hotels on the property. This property is known as UPRR "Lot 10" or may also be known as "Union Pacific Place." The developer proposed "Excavation and Off-site Disposal" to remove soil contaminated with lead and arsenic. The purpose of this interim measure is to protect human health during construction and also workers and patrons of the development following its construction.

In addition, prior to the transfer of the property to the developer, EPA and UPRR executed a restrictive covenant pursuant to Nebraska's Uniform Environmental Covenants Act (UECA) to restrict residential and other uses of the property. For more detail on this interim measure see the "Remedial Action Plan, Lot 10, Union Pacific Place, 12th to 14th Streets, Cuming to Izard Streets, Omaha, Nebraska, 68102 (2006)" and the UECA for Lot 10 in the Administrative Record.

The activities undertaken by the developer of Lot 10 and UPRR as an interim measure are consistent with, and will contribute to, the performance of EPA's proposed UPRR OU2 and UPRR OU3 corrective measures.

CONTINGENT CORRECTIVE MEASURES FOR RESTRICTED RESIDENTIAL USE

Discussions with the City of Omaha officials lead EPA to believe that residential developments could be proposed for portions of UPRR OU1 or UPRR OU2 (please recall also that the groundwater beneath UPRR OU1 and UPRR OU2 is known as UPRR OU3). The redevelopment of Omaha's riverfront area is expected to continue and has included several portions of the facility. UPRR OU1 has already been redeveloped into the Qwest Center. Saddle Creek Records located at 13th to 14th Streets from Cumming to Webster Streets is being developed with mezzanine residential occupancy. Lot 10 - Union Pacific Place located at 12th to 14th Streets and Cuming to Izard Streets is being developed into two hotels. Please note that EPA does considers the transient residency at these hotels to be non-residential use.

The corrective measures proposed above are for non-residential uses of the facility and are not protective of residential developments. Therefore, EPA believes that it is prudent to propose contingent corrective measures and cleanup levels that are protective of human health and the environment in the event that residential development will occur. Not only will this provide for the widest range of redevelopment of the facility by allowing the City of Omaha and developers to make informed redevelopment decisions; but it will eliminate possible delays due to EPA's processes for modifying approved corrective measures and cleanup levels.

The proposed contingent corrective measures and cleanup levels below are based upon the assumption that any residential development will consist of mezzanine (second story or above) residential development. Furthermore, such restricted residential use will not allow the extraction or other use of groundwater from UPRR OU3. Development projects without residential occupancy are not required to implement the contingent corrective measures for restricted residential development. EPA cautions that it is unlikely that conversion of a non-residential development into a residential development could be accomplished due to the difficulty in assessing contaminant concentrations once a development is completed. In any event, amendment of the environmental covenants established pursuant to EPA's proposed corrective measures above which prohibit residential development is required and will require approval and signature by both EPA and UPRR.

Before restricted residential development can occur, both soil and groundwater beneath the parcel or parcels of the facility where residential occupancy is proposed must be remediated to meet the restricted residential cleanup levels. EPA is not proposing corrective measures different from those proposed above for UPRR OU2 and UPRR OU3 and therefore do not require additional evaluation against EPA's general standards and selection factors. The proposed contingent corrective measures for restricted residential development are not substantially different from those EPA selected at UPRR OU1 Saddle Creek Records except for the inclusion of corrective measures and cleanup levels for groundwater proposed in this Statement of Basis.

EPA proposes the following contingent restricted residential corrective measures:

<u>EXCAVATION, DISPOSAL and PROTECTIVE COVER</u>

- Excavation and Off-site Disposal of all contaminated soil to meet restricted residential use cleanup levels in the table below or the specified actions described next for contaminated soil.

- The following alternative for contaminated soil is proposed which may be implemented instead of Excavation and Off-site Disposal:

    - Excavation and Off-site Disposal of all soil contaminated with volatile organics, semi-volatile organics, pesticides and polychlorinated biphenyls to meet the restricted

residential cleanup levels in the table "Restricted Residential Use Soil Cleanup Levels" below.

- Excavate lead contaminated soil until lead levels are below 400 milligrams per kilogram (mg/kg) in soil from the ground surface to a minimum depth of one foot from the ground surface and backfill with a minimum of one foot of clean fill. Alternatively, cover soil with lead concentrations greater than 400 mg/kg but less than 1,200 mg/kg with a minimum one foot of clean fill.

- Excavate lead contaminated soil in areas identified as green space soil so that lead levels are below 400 mg/kg for soil from the ground surface to a depth of one foot if covered by turf grass. If deeper plantings are installed, the planting will be over excavated to a depth of 1 foot below the depth of the deepest root ball or a maximum of 3 feet below grade if the soil lead concentration exceeds 400 mg/kg. Clean fill will be used to replace the excavated soil.

- If the final development elevation will be below the original ground elevation at the time of the RFI, soil will be removed to a minimum of one foot below the final development elevation and backfilled with clean soil. Alternatively, soil with lead concentrations greater than 400 mg/kg in the first one foot of depth from the ground surface may be covered "capped" with a minimum one foot of clean fill.

- Parking lots, sidewalks or buildings may cover soil with lead concentrations less than 1200 mg/kg. If soil contains greater than 1200 mg/kg lead, it shall be covered with a minimum of one foot of clean fill prior to construction of buildings and appurtenances, parking lots or side walks.

- Soil that may or will be disturbed by construction with soil lead concentrations higher than 1200 mg/kg shall be removed to a depth of one foot below the depth of excavation necessary for building foundations, utilities, etc., and construction workers in the area must be informed of the risks and safety precautions must be used. These excavations shall be backfilled with clean fill as construction is completed.

- "Clean fill" is soil that has constituent concentrations below those identified above for UPRR OU2 in the column labeled "Contingent Residential Cleanup Level" except the clean soil lead level shall be 200 mg/kg or less.

- Soil excavated shall be disposed as a solid or hazardous waste in accordance with local, state and federal laws and regulations. Soil is a hazardous waste if the soil is determined to exceed the TCLP action levels in 40 CFR 261.24.

RESTRICTED RESIDENTIAL USE SOIL CLEANUP LEVELS[2]

Contaminant	Health Effect	Contingent Restricted Residential Soil Cleanup Level (mg/kg)
Acetone	Toxicity	14,000
Benzene	Cancer	0.66
cis-1,2-Dichloroethene	Toxicity	43
trans-1,2-Dichloroethene	Toxicity	69
Ethyl Benzene	Toxicity	400
Methylene Chloride	Cancer	8.9
Tetrachloroethene	Cancer	0.55
Toluene	Toxicity	520
1,1,1-Trichloroethane	Toxicity	1,200
Trichloroethene	Cancer	0.043
1,2,4-Trimethylbenzene	Toxicity	52
Vinyl Chloride	Cancer	0.043
Xylenes	Toxicity	210
Anthracene	Toxicity	22,000
Benzo(a)anthracene	Cancer	0.15
Benzo(a)pyrene	Cancer	0.015
Benzo(b)flouranthene	Cancer	0.15
Bis(2-ethylhexyl)phthalate	Cancer	35
Chrysene	Cancer	15
Dibenzo(a,h)anthracene	Cancer	0.015
Fluoranthene	Toxicity	2,300
Indeno(1,2,3-cd)pyrene	Cancer	0.15
Naphthalene	Toxicity	120
Pyrene	Toxicity	2,300
Chlordane	Cancer	1.6
4,4-DDE	Cancer	1.7
4,4-DDT	Cancer	1.7
Dieldrin	Cancer	0.03
Endosulfan II	Toxicity	370
Endrin aldehyde	Toxicity	18
PCBs (total all PCBs)	Toxicity	0.22
Antimony	Toxicity	31
Arsenic	Toxicity	22

[2] These levels were selected from EPA Region VI Human Health Medium Specific Screening Levels (2007)

Contaminant	Health Effect	Contingent Restricted Residential Soil Cleanup Level (mg/kg)
Cadmium	Toxicity	39
Chromium	Cancer	210
Copper	Toxicity	2,900
Lead	Toxicity	400
Mercury	Toxicity	23
Selenium	Toxicity	390
Silver	Toxicity	390
Zinc	Toxicity	23,000

NATURAL ATTENUATION

- Natural Attenuation of groundwater contaminants to meet the restricted residential cleanup levels for groundwater in the table "Restricted Residential Use Groundwater Cleanup Levels" below.

RESTRICTED RESIDENTIAL USE GROUNDWATER CLEANUP LEVELS[3]

Contaminant	Vapor Intrusion Residential GW Screening Level (µg/L)
Benzene	12
n-Butylbenzene	14,000
tert-Butylbenzene	4,569
Chlorobenzene	4,284
Chloroethane	24
Chloroform	5
4-Chlorotoluene	To Be Determined
1,2-Dichlorobenzene	27,460
cis-1,2-Dichloroethene	1,898
trans-1,2-Dichloroethene	1,856
Ethylbenzene	87
Isopropylbenzene	173

[3] These levels were developed using the Johnson and Ettinger Model to predict indoor air concentrations of volatile organic compounds

Contaminant	Vapor Intrusion Residential GW Screening Level (µg/L)
Methylene Chloride	343
Methyl tertbutyl ether	455,900
Naphthalene	893
n-Proplybenzene	5,558
Tetrachloroethene	14.4
Toluene	2,300
Trichloroethylene	0.57
1,2,4-Trimethylbenzene	456
1,3,5-Trimethylbenzene	391
Vinyl Chloride	1.6
Xylenes	178,000

LONG-TERM GROUNDWATER MONITORING

- Long-Term monitoring of contaminants in the groundwater to document the effectiveness of natural attenuation.

VAPOR INTRUSION MITIGATION

- Vapor Intrusion Mitigation to control VOC contaminants in structures where structures are located above soil or groundwater contaminated above the vapor intrusion screening levels in the table below.

LONG-TERM MONITORING OF VAPOR INTRUSION CONTAMINANTS

- Long-Term monitoring of vapor intrusion contaminants in structures and subsurface soil vapor and in groundwater.

INSTITUTIONAL CONTROLS

- Institutional controls including but not limited to a restrictive covenant pursuant to the Nebraska Uniform Environmental Covenant Act, Neb. Rev. Stat. § 76-2601 *et seq.* (Supp. 2005) to preserve the final corrective measures decision, to prevent extraction of contaminated groundwater, to maintain protective barriers to prevent exposure to groundwater contaminants and to provide for other restrictions to protect human health.

LONG-TERM MONITORING AND MAINTENANCE

- Long-Term monitoring of the effectiveness of the institutional controls. Conduct annual inspections of the corrective measure and provide proper maintenance to insure the integrity of the corrective measure. The site shall also be reviewed to determine that any construction or excavation has been in accordance with the covenant.

The situation may also arise where a property owner would want to remove all restrictions imposed by institutional controls. EPA is not proposing unrestricted use corrective measures or cleanup levels at this time. Given the nature and extent of the contaminants found at UPRR, EPA does not believe that institutional controls can be removed in the foreseeable future. EPA is not precluding the possibility that complete cleanup can be achieved. However, this will require evaluation on a case by case basis. In the event that a successful demonstration of complete cleanup is made to EPA's satisfaction, EPA would prepare a new statement of basis proposing the removal of all institutional controls and provide for public notice and public review and comment before making a final decision in such matters.

CONCLUSION

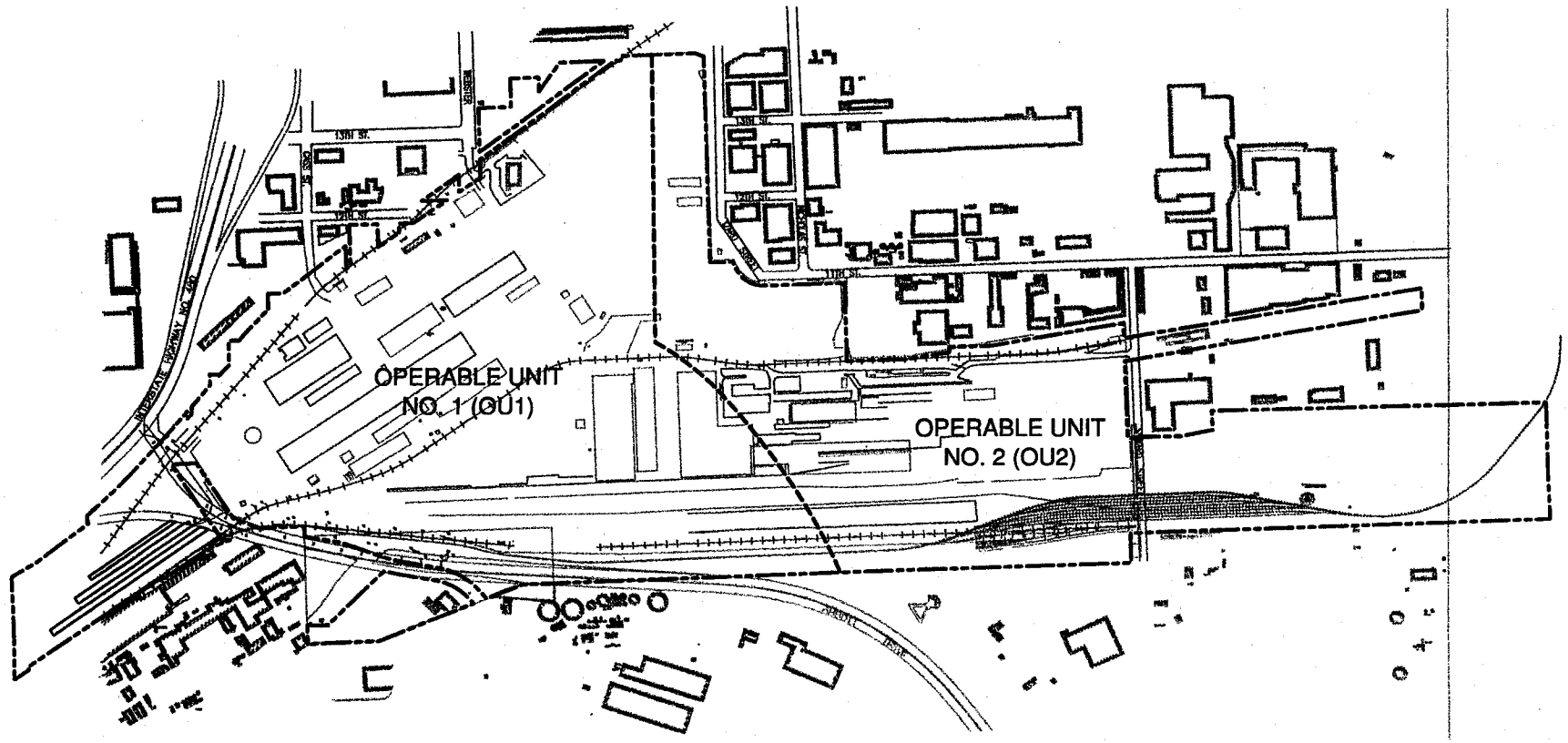
The proposed corrective measures meet the general standards of protection of human health and the environment, attainment of media cleanup standards (corrective action objectives), control of the sources of releases, and compliance with applicable waste management standards required of all corrective measures. They provide the best balance of the selection factors: long-term reliability and effectiveness, reduction of toxicity, mobility, or volume of wastes, short term effectiveness, implementability and cost.

The interim measures conducted by UPRR and others are consistent with, and will contribute to, the performance of EPA's proposed UPRR OU2 and UPRR OU3 corrective measures.

Done this 18th day of May, 2007.

Kenneth Herstowski
Project Manager
RCRA Corrective Action and Permits Branch
Air, RCRA, and Toxics Division

FIGURES



OPERABLE UNIT NO. 3 (OU3) INCLUDES GROUNDWATER UNDERLYING THE ENTIRE OMAHA SHOPS PROPERTY.

LEGEND

UPRR OMAHA SHOPS PROPERTY LINE

OPERABLE UNIT

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SCALE IN FEET

OPERABLE UNITS

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

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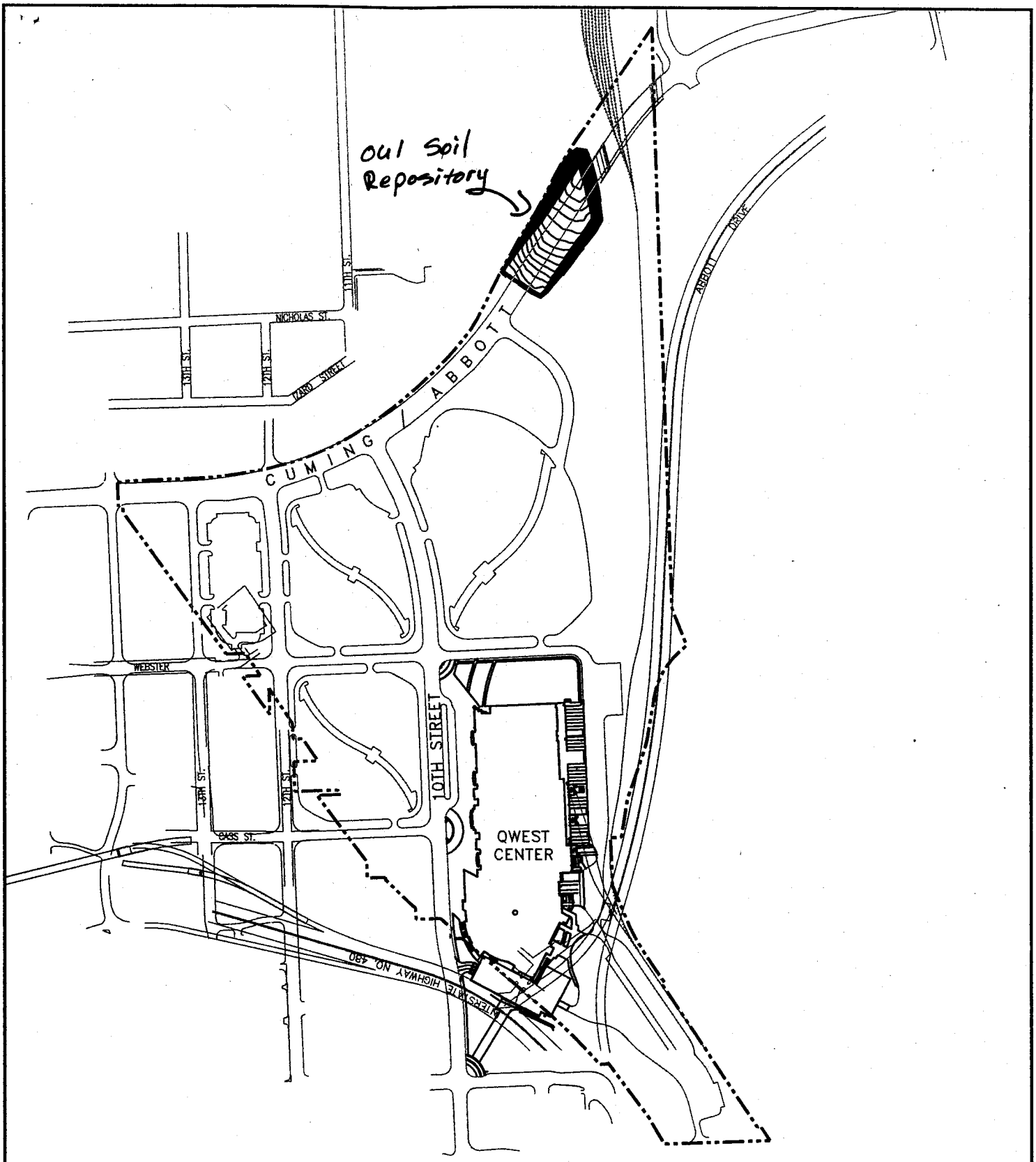

LEGEND

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OU1 SITE LOCATION PLAN

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

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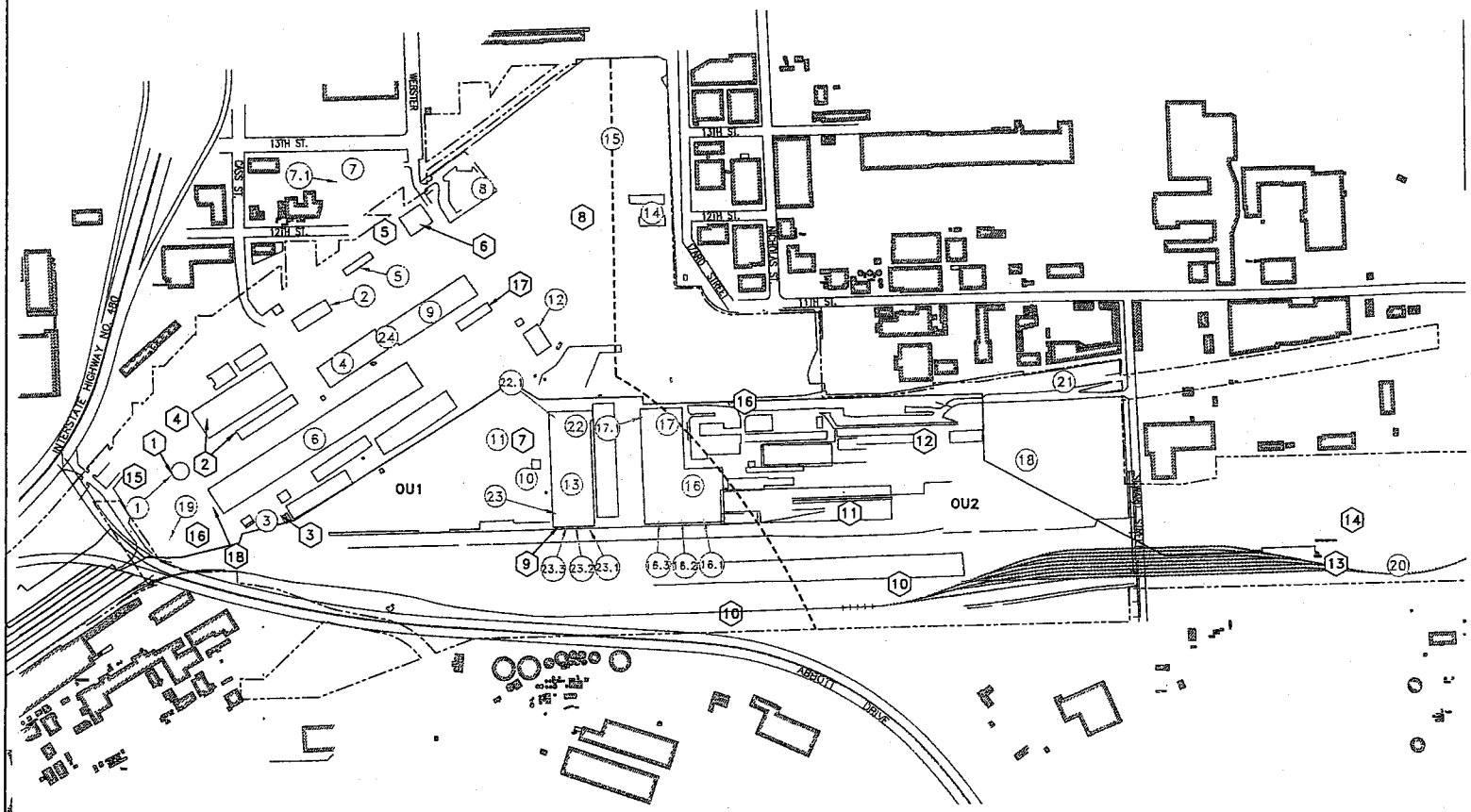

LEGEND

- (23) SOLID WASTE MANAGEMENT UNIT
- (9) AREAS OF CONCERN
- PROPERTY LINE
- OU1/OU2 BOUNDARY
- OIL PIPELINE
- RAILROAD
- STRUCTURES

AREAS OF CONCERN

1 DIESEL SERVICING FACILITY
2 EAST AND WEST STORES AREAS
3 DIESEL FUEL STORAGE TANK
4 OIL RECEIVING AREA
5 FUEL STORAGE AREA
6 CHEMICAL STORAGE BUILDING
7 OIL TANKS/PUMP HOUSE
8 EAST AND WEST CAR DISMANTLE AREAS
9 OIL AND WASTE HOUSE
10 EIGHTH STREET YARD
11 CAR HOLDING AREA
12 CAR DEMOLISHING AREA
13 GRACE STREET TANK & PUMPHOUSE
14 GRACE STREET YARD
15 DIESEL FUEL UNLOAD FACILITY
16 OIL PIPELINE
17 PRINT SHOP
18 LUBE OIL STORAGE AND PUMPHOUSE

SOLID WASTE MANAGEMENT UNITS

1 ROUNDHOUSE
2 OLD RESEARCH LABORATORY
3 BABBIT SHOP/WASTEWATER TREATMENT PLANT
4 BLUE BUILDING
5 NEW TRANSFORMER STORAGE AREA
6 TRACTION MOTOR SHOP/MACHINE SHOP
7 RESEARCH AND DEVELOPMENT LABORATORY
7.1 RESEARCH AND DEVELOPMENT LABORATORY PARTS WASHER.
8 TEMPORARY HAZARDOUS WASTE STORAGE AREA
9 OLD TRACTION MOTOR SHOP
10 WHEEL KNOCK-OFF SHOP
11 ACETYLENE PIT
12 OLD AND NEW POWER HOUSES/WASTE OIL TANK
13 WHEEL SHOP
14 PAINT BARREL PITS
15 OLD TRANSFORMER STORAGE AREA
16 STEEL CAR SHOP
16.1 STEEL CAR SHOP HAZARDOUS WASTE STORAGE AREA
16.2 STEEL CAR SHOP NONHAZARDOUS WASTE STORAGE AREA
16.3 STEEL CAR SHOP SATELLITE ACCUMULATION AREAS
17 TIN AND PLATING SHOP
17.1 TIN AND PLATING SHOP PARTS WASHER
18 NORTH AND SOUTH OPEN DRUM STORAGE
19 FUEL RECOVERY AREA
20 NORTH AND SOUTH ACETYLENE SLUDGE PITS
21 CHEMICAL SPILL AREA
22 OLD PAINT SHOP
22.1 OLD PAINT SHOP SATELLITE ACCUMULATION AREA
23 NEW PAINT SHOP
23.1 NEW PAINT SHOP ENCLOSED PAINT BOOTH
23.2 NEW PAINT SHOP OPEN PAINT BOOTH
23.3 NEW PAINT SHOP SATELLITE ACCUMULATION AREA
24 INTERIM STATUS CONTAINER STORAGE AREA

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OU SWMU AND AOC LOCATION MAP

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

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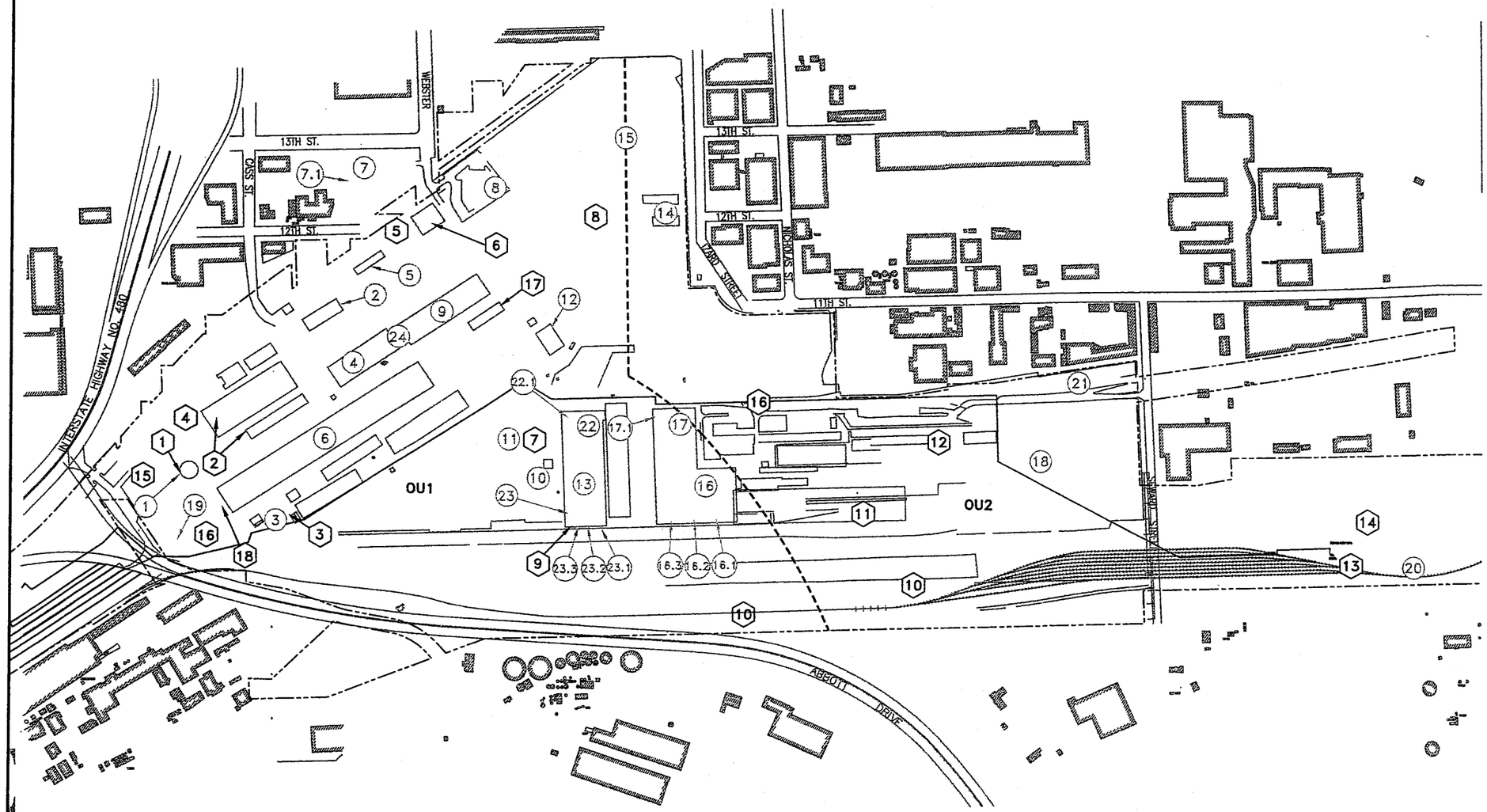

LEGEND

- (23) SOLID WASTE MANAGEMENT UNIT
- (9) AREAS OF CONCERN
- PROPERTY LINE
- OU1/OU2 BOUNDARY
- OIL PIPELINE
- RAILROAD
- STRUCTURES

AREAS OF CONCERN

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5 FUEL STORAGE AREA
6 CHEMICAL STORAGE BUILDING
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SOLID WASTE MANAGEMENT UNITS

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7.1 RESEARCH AND DEVELOPMENT LABORATORY PARTS WASHER.
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23.1 NEW PAINT SHOP ENCLOSED PAINT BOOTH
23.2 NEW PAINT SHOP OPEN PAINT BOOTH
23.3 NEW PAINT SHOP SATELLITE ACCUMULATION AREA
24 INTERIM STATUS CONTAINER STORAGE AREA

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OU SWMU AND AOC LOCATION MAP

OMAHA SHOPS
UNION PACIFIC RAILROAD COMPANY

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